Dealers Win Prizes In Display Contest

(Concluded from Page 1, Column 2)

given to The Golden Rule of St. Paul, which handles Frigidaire.

In the contest for central station windows of less than 100 sq. ft., the $100 prize was voted to the Consumers Power Co. of Jackson, Mich., for its Frigidaire display. The $50 second prize went to the Blackstone Valley Gas & Electric Co., Pawtucket, R. I. Its display featured Frigidaire.

Southern Colorado Power Co. of Pueblo led the competition for central station windows of more than 100 sq. ft. with its G-E exhibit, and took the $100 prize in that classification. Second was the Lynn Gas & Electric Co. of Lynn, Mass., with another G-E display.

Special prize of $100 was awarded to the Electric Refrigeration Bureau of Petersburg, Va., for being the local bureau having best representation in the contest, in point of proportion of member contestants and quality of their exhibits. From Petersburg were six entries, representing 100 per cent of the dealer membership of the bureau.

Points considered by the judges in selecting the best displays were sales appeal, originality, general attractiveness, and special features such as color, lighting effects, motion, etc.

New Air Conditioners Shown in New York

(Concluded from Page 1, Column 2)

air-conditioning system in Radio City.

The exposition features new equipment in controls and accessories, as well as several new air-conditioning units. Thus General Electric is showing a gas-fired furnace, York Ice Machinery shows a new half-ton cabinet air conditioner, and Westinghouse is displaying a six-ton refrigerating machine.

Quite a number of refrigeration systems are on display in connection with air conditioning, among these are Baker, Carrier, Frick, Frigidaire, General Electric, Westinghouse, and York.

Advance News
from
COPELAND

Distributors Take Notice

In addition to the complete line of Commercial Units now available to the trade (18 models), Copeland has added a range of Household refrigerators to sell at moderate prices.

The Household line is made up in all the popular sizes; very attractive in appearance and *priced to sell.*

Nothing experimental — No radical departures from proven practices— Sturdy, efficient, safe.

Distributors who have not yet made their 1934 commitments should wait a few days for Copeland. It will pay them to do so.

Copeland franchises are drawn to make the distributor happy — to let him make profits without losing them in free service.

Copeland is set for a big year in 1934 and invites live merchandisers to go along with us.

The right refrigerator at the right price will have the call this year
COPELAND offers BOTH

Write for details today
COPELAND REFRIGERATION CORP.
Mount Clemens, Mich.

Copeland
DEPENDABLE ELECTRIC REFRIGERATION

Universal Cooler Triples Production Capacity Of Factory

(Concluded from Page 1, Column 5)

the shop for the various machining operations in progressive order. On the other side of the shop is another aisle for the finished parts to be taken back to the inspection department where they are completely checked before they proceed into the compressor parts stock room, and then to the assembly benches.

The compressor assembly department is in the next section of the building. The various assemblies are made successively along the line, and when the compressors are assembled, they are put onto a conveyor which takes them to the proper place for them to be mounted on the condensing unit bases.

Three power-driven conveyor lines have been arranged for assembling condensing units. Two of these are for the small machines for household refrigerators, and one is for commercial condensing units. These lines are spaced well apart to provide ample room for stock between them.

The various parts of the condensing unit are pieced together as the line moves along, and when it reaches a turntable at the end of the line it is complete but for motor, drive-belt, and refrigerant charge. It is painted with an air brush on the turntable and then routed through a bake oven (on a conveyor) where a vacuum is pulled and the units dehydrated. The oven has a capacity of some 600 units.

At right angles to this conveyor line, directly beyond the bake oven, is another short conveyor, along which the motor is mounted in place and the machine charged with refrigerant from overhead charging boards.

Refrigerant Charging

Method of supplying the charging boards has been worked out in a novel manner. A small building has been built outside of the main plant to house the drums of refrigerants. The drums are connected to pipes, and are then heated, causing the refrigerant to flow as a liquid under its own pressure to the various charging boards.

After the motors and belts are added to each unit, and the commercial machines go to the inspection department for further test, and the domestic units proceed on a conveyor into the department where they are installed in the cabinets.

A section of the building next to the assembly department is the tin and solder shop. Here, domestic evaporators, condensers, and receivers are prepared for the final assembly line.

Some parts such as the double tube water-cooled condensers, certain types of household refrigerator coils, and other parts, are completely fabricated here. Facilities for completely cleaning, dehydrating, and painting these parts are also provided in this department.

The large section of the building at the east end will be used entirely for the final assembly and testing of household refrigerators. Three conveyors bring the cabinets into the plant, and serve as a reserve to permit constant operation of the assembly line where the refrigerating equipment is installed in the cabinet.

Two conveyor lines—one bringing the cabinets from this reserve, the other bringing the refrigerating systems from the unit assembly department—come together in one corner of this section of the building. Here the condensing unit is placed in the base of the cabinet, the evaporator is put in place, and the system is hooked up ready to start.

From this stage, each complete refrigerator proceeds on its individual truck to the test line, where it is tested in actual operation.

There is room on the test lines for 1,000 refrigerators in operation. On the conveyors ahead of the assembly line are accommodations for 600 cabinets. The machine shop, compressor assembly, condensing unit assembly, and other parts of the plant are capable of producing at least 600 units each shift.

When a refrigerator has passed the final test and has been approved by the inspector, it is carried on a power conveyor to the shipping department, a separate building at the back of the plant on the New York Central tracks. There is space on the Universal Cooler side-track for about 20 cars.

One entire separate building has been set aside for the service department. The front part of this building is the office which houses the local service department, the national service department, the parts order department, etc.

The service department has its own stock room, a repair and salvage department, as well as its own facilities for shipping parts ordered.

Extension of manufacturing facilities has also necessitated more office space. A suite of offices in another section of the building is now occupied by the treasury, accounting, and credit departments.

The Universal Cooler Corp. recently announced that from 1929 until the end of 1933, it has shown a profit each year.

Delay Approval of Fair Practice Code

(Concluded from Page 1, Column 1)

lieve, should abide by the provisions of the general retailers code and the general wholesalers code, already approved (see story in this issue dealing with wholesaler's code and issue of Oct. 25 concerning the retailer's code).

Deleted from the code by this section of the code are clauses (a), (b), (c), and (e) of the Article VI which were concerned with a minmum down payment, length of time payments, mandatory interest charges, and application of terms to rental purchase plans. It also resulted in the elimination of section (d) of Article IV which declared that "Used competitive apparatus shall not be accepted in partial payment for the products of the industry for sums greater than will be realized in the resale of such used products . . . "

2. At a pre-hearing conference in Chicago Jan. 9 numerous changes were made in Article IV, dealing with advertising and sales promotion. Clause (b) as printed in the original code, which banned advertising containing representations of a negative character, was eliminated as was clause (f) which was designed to prevent advertising dealing directly with the hazards involved in the use of various refrigerants. Considerable alteration was made in the wording of other clauses in this section.

At the open hearings a representative of the National Retail Dry Goods Association made verbal objections to certain clauses which in his interpretation gave the manufacturers jurisdiction over retailer operations, but these matters were later taken care of by the post-hearing conference.

Mr. Irving Fox, the association's representative, also attempted to have the codemakers include a provision protecting retailers against patent infringement suits, but the matter was passed over by Assistant Deputy Administrator J. G. Cowling, who conducted the hearings.

General Electric filed lengthy briefs objecting to Article V (b) (service policy provision) which finally devolved into the point that in General Electric's opinion "the sole issue with respect to Article V (b) is whether G-E has the right to establish attractive sales plans and prices for its products and services, to its own customers, or whether it must accept a fixed schedule of replacement charges which is apparently intended to offset, competitively, the inherent quality advantage of the G-E 'Monitor Top' mechanism."

The proponents of the code claim that in principle the NRA desires that industry shall be controlled by such constructive policies as may be agreed upon by a majority in representative trade associations. The principle involved in the service policy and replacement cost clause, the code committee points out, is supported by 17 out of 18 members of a representative trade association.

The code committee also declares that "because of the far-reaching and harmful effects of warranties, so-called 'free service' and 'free replacement plans' " it is believed that the omission of a clause regulating such practices would result in the development of a code which would, as a result of such omission, violate section 3 (a) of the NIRA, which provides "that such codes are not designed to promote monopolies or to eliminate or oppress small enterprises and will not operate to discriminate against them and will tend to effectuate the policy of this title."

The Consumers' Advisory Board also entered an objection to Article V (a) and (b) on the basis that such provisions amount in effect to price fixing and tend to suppress fair competition in the industry.

Westinghouse Gets $500,000 Order

(Concluded from Page 1, Column 4)

aid in the merchandising campaign. Properties of the companies involved extend into Iowa, North and South Dakotas, Wisconsin, and Minnesota.

Sale of the equipment to these organizations was handled by Charles Dostal, merchandise manager of the Chicago Wesco branch.

Extra Dry ESOTOO
LIQUID SULPHUR DIOXIDE
V-METH-L
METHYL CHLORIDE

WEST NORFOLK, VA.
131 State St., Boston, and 76 Beaver St., New York

Testing Service
for Domestic and Commercial Electric Refrigeration
Testing and experimental laboratory service for Manufacturer, Distributor, Central Station. Test data exclusive property of client.
Electrical Testing Laboratories
80th St. & East End Ave.
New York

Only GIBSON Dealers can sell ALL THREE MAJOR MARKETS

INCREASED REFRIGERATOR SALES

Join the BIG DRIVE

If a Dealer franchise will increase your sales and profit possibilities at least 33 1-3% that's good business, isn't it? If that same franchise opens an entirely new market with practically no competition; that's also good business. If there is a franchise that will do all that for you, with the assurance of a reputable manufacturer to back it up, then it is a matter of good business for you to find out about it. And certainly there is no better time than RIGHT NOW. We ask you to consider the Gibson franchise on a cold cash basis.

Size it up from every angle. Make comparisons. If Gibson offers you more, that is the franchise you should have.

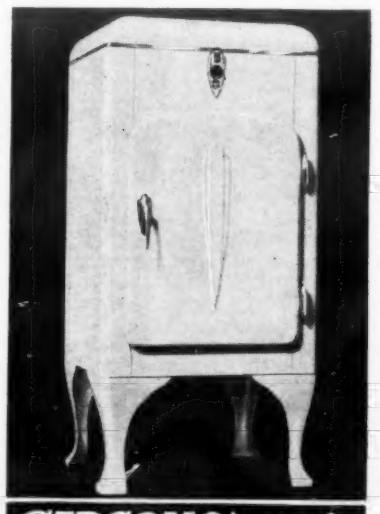
Gibson has a complete household electric line—a complete Commercial line and a COMPLETE LINE OF KERO UNITS for unwired homes. There's a Gibson for *every* home and for every income. Prices are *right.* Discounts are very *liberal.*

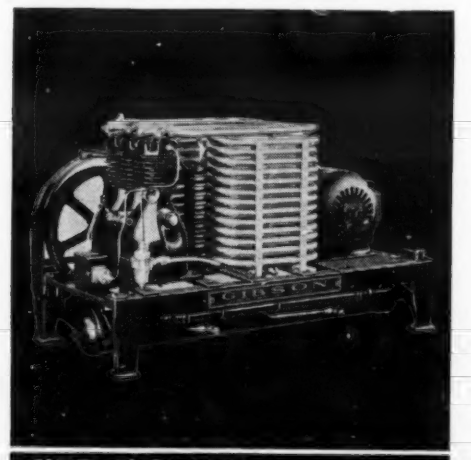
Without any obligations to you whatever we shall be glad to send complete information regarding the Gibson Dealer franchise.

No matter which way the Consumer price range swings in '34, Gibson Dealers are set to take advantage.

GIBSON
ELECTRIC REFRIGERATOR CORP.
Greenville, Mich.

Export Sales Dept. 201 North Wells Street, Chicago, Illinois.
Cable Address "GIBSELCO" Chicago. Bentley Code.


GIBSON Electric REFRIGERATION


GIBSON Commercial REFRIGERATION

GIBSON KERO UNIT REFRIGERATION

THE NEWSPAPER OF THE INDUSTRY

ELECTRIC REFRIGERATION NEWS

WRITTEN TO BE READ ON ARRIVAL

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1,080,000 HOUSEHOLD REFRIGERATORS SOLD DURING 1933

Benefits of Air Conditioning to Health Stressed

A. S. H. V. E.'s Convention Reports New Research In Air Conditioning

By John T. Schaefer

NEW YORK CITY—That air conditioning has possibilities of far-reaching importance for improving the health of human beings living in American climates was emphasized by several members of the medical profession who addressed the 40th annual convention of the American Society of Heating and Ventilating Engineers which was held at the Biltmore Hotel here last week.

Doctors who concurred in this view were Dr. W. J. McConnell of New York City, Dr. C. A. Mills of Cincinnati, and Dr. Garland Weidner of Lexington, Ky.

The five-day program of the convention was replete with technical research into problems of air conditioning and reports of various studies in which the society is cooperating.

Running simultaneously with the convention at the Biltmore was the Third Annual Heating and Ventilating Exposition at the Grand Central Palace where manufacturers of heating, ventilating, and air-conditioning systems exhibited their equipment for inspection by convention delegates.

A complete description of refrigeration and air-conditioning exhibits is published in an adjoning column of this issue of the NEWS. Some of the papers presented at the convention are also reported in this issue.

Registration at sessions of the convention totalled slightly above 650, according to C. V. Hutchinson, secretary of the society.

First meetings were held Monday morning, with a program of society business—registration, meeting of the election tellers, council meeting, etc.

That afternoon the first technical session opened with a welcome by

(*Continued on Page 12, Column 1*)

Frigidaire Meetings To Begin This Month

DAYTON—Frigidaire dealers and salesmen from coast to coast will meet late this month and early in March with factory officials to hear the company's 1934 selling and advertising plans, according to H. W. Newell, vice president.

Four squadrons of men from headquarters will visit 36 key cities on road show schedules to carry 1934 plans to field forces.

Frank R. Pierce, sales manager, will head the party making the swing westward. Members of his crew are: R. B. Ambrose, retail commercial sales manager; A. D. Farrell, manager of window displays and exhibits; Ellsworth Gilbert, general sales staff; and

(*Concluded on Page 6, Column 4*)

Air-Conditioning Systems Shown at A.S.H.V.E. Convention

NEW YORK CITY—What is virtually America's annual "air-conditioning show" ran for five days at the Grand Central Palace here last week when throngs of engineers, contractors, distributors, manufacturers, and home owners visited the Third Annual Heating and Ventilating Exposition which was held simultaneously with the A. S. H. V. E. convention.

The entire hall was filled with exhibits, with about 150 firms displaying equipment. Equipment shown included complete year around air-conditioning systems, heating systems, room coolers, and all manner of parts, controls, accessories, fittings, and materials.

Although heating plants predominated in number of exhibits and space, it was noteworthy that refrigeration as applied to air conditioning received more attention than in previous shows both in exhibit space and interest of visitors.

Also, a number of furnace manufacturers which have heretofore sug-

(*Continued on Page 10, Column 1*)

Temprite Steps Up Cooler Production

DETROIT—Development of a new production assembly line and the addition of new floor space, assembly tools and equipment will enable Liquid Cooler Corp. to step up its production of Temprite beer and water coolers to 100 units a day, practically double that of last year, according to William R. Clark, general manager of Liquid Cooler Corp.

Also set up in the Liquid Cooler plant is a new laboratory, under the direction of H. B. McLaughlin, chief engineer, in which tests are conducted on newly designed coolers and cooler parts, and checks made on the operating capacities of the various Temprite models.

One of the results of this laboratory activity has been a "standardization"

(*Concluded on Page 6, Column 3*)

York Develops Five Air Conditioners

NEW YORK CITY—Five new air-conditioning units were announced by York Ice Machinery Corp. at the Third International Heating and Ventilating Exposition here last week. The new equipment is to be sold through York's commercial air-conditioning division, and is already being placed with York dealers and distributors.

The company's new model F-75-D4 is a floor-type summer air conditioner. This is a midget with ½ to ¾ tons of refrigeration capacity, modernistic in design, with black rubbed enamel finish and stainless steel trimmings. A cooling unit which filters, recirculates, cools, and dehumidifies the air is built into the cabinet.

Model F-125-D4 is a year-round air conditioner for residences, professional offices, specialty shops, and all

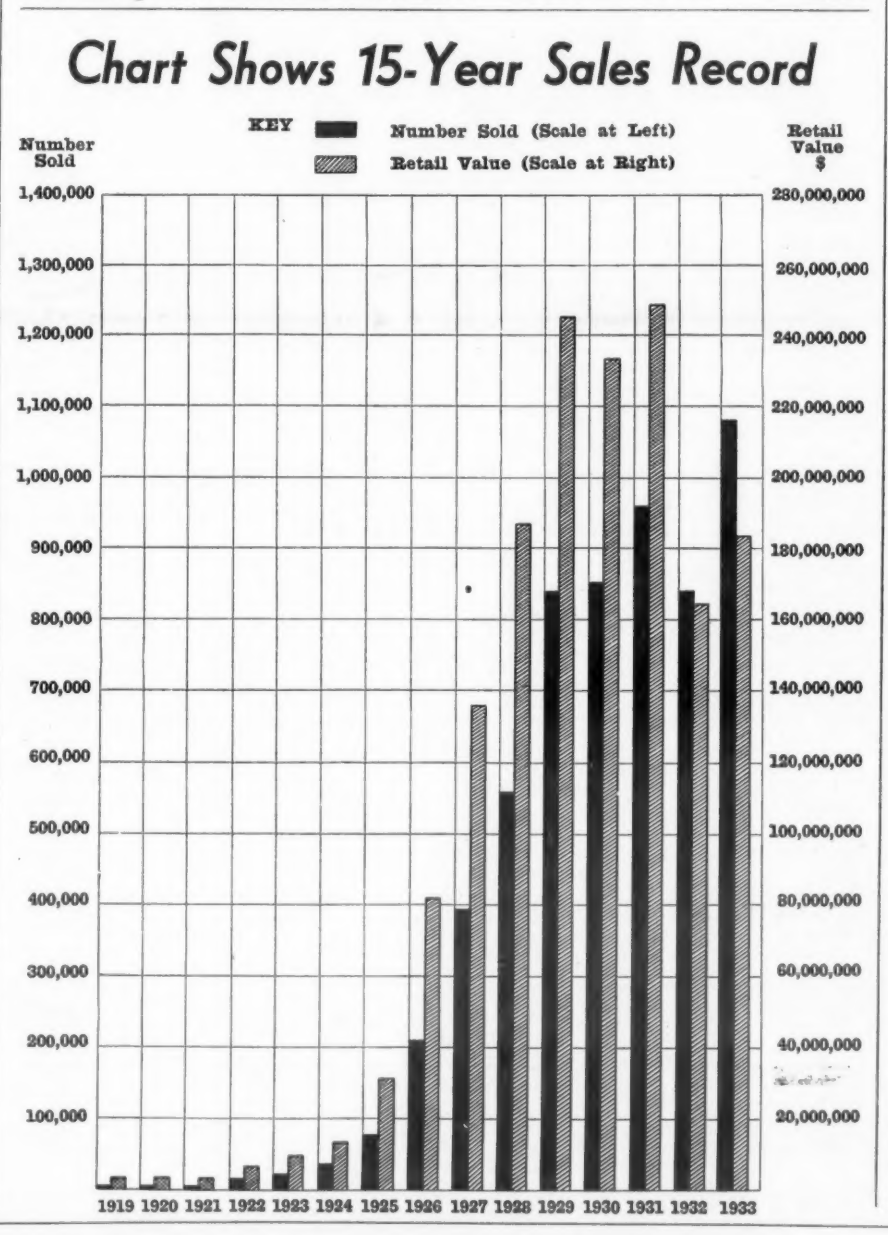
(*Concluded on Page 11, Column 2*)

Household Electric Refrigeration Market Now 23.5% Saturated

4,665,000 Units Estimated in Use in U.S.

Estimated total sales of Household Electric Refrigerators (including 55,000 exports) by all U. S. manufacturers during 1933	1,080,000
Estimated average retail price	$170
Estimated total retail value	$183,600,000
Estimated total number of Household Electric Refrigerators sold by all U. S. manufacturers up to Dec. 31, 1933	5,885,000
Deduct stocks in hands of dealers	75,000
	5,810,000
Deduct total exports up to Dec. 31, 1933	345,000
	5,465,000
Deduct total estimated obsolescence and replacement	800,000
Estimated total in use in U. S. on Jan. 1, 1934	4,665,000
Divide by number of wired homes in U. S.	19,843,724
Percentage of market saturation	23.5

Chart Shows 15-Year Sales Record



Unit Sales Set Record; Dollar Volume Lower

Average Retail Price for 1933 Is Estimated At $170

By A. J. Cutting

Manufacturers of household electric refrigerators sold a total of 1,080,000 units during 1933 setting a new all time high for the industry, and bettering the 1931 record of 965,000 by over 100,000 units. That 1933 was to be the most successful year in the history of household refrigeration from the viewpoint of unit sales volume, became an established fact when the long coveted million mark was passed last October.

The eleven reporting members of the Refrigeration Division of the National Electrical Manufacturers Association accounted for 908,877 household refrigerators during 1933 being responsible for about 84 per cent of total industry sales. In 1932 the ratio between Nema and non-Nema companies was 80-20, but a survey conducted in November indicated that the division of total business in 1933 was as follows: Nema reporting members 84 per cent, Nema non-reporting members 4 per cent, non-association companies 12 per cent.

Total household sales by the following Nema companies were included in the report for the year: Crosley, Frigidaire, General Electric, Gibson, Grigsby-Grunow, Kelvinator, Norge, Servel, Trupar, Universal Cooler, and Westinghouse. Copeland ceased to be a reporting member after the first few months of the year. During 1933 the Nema ranks were augmented by the addition of Merchant & Evans Co., Potter Refrigerator Corp., Stewart-Warner Co., Sunbeam Electric Mfg. Co., Uniflow Mfg. Co., and Rudolph Wurlitzer, Inc. It is understood that the sales figures of these companies will be included in the association monthly reports during 1934.

With the inclusion of the 1,080,000

(*Concluded on Page 2, Column 1*)

Ask Labor Clause in Nema Division Codes

WASHINGTON, D. C.—A proposal that supplemental codes of fair competition for the various divisions of the electrical manufacturing industry include labor provisions was made by Dr. Schurz of the NRA Labor Advisory Board at a re-hearing on the electrical industry code held here last week.

At present all the divisions subscribe to the 36-hour week, 40 cents an hour minimum wage provisions of the basic code for the industry which was proposed by the National Electrical Manufacturers' Association and approved by President Roosevelt.

The electrical manufacturing indus-

(*Concluded on Page 6, Column 4*)

Louis Ruthenburg, busy consultant to the Refrigeration Division of the National Electrical Manufacturers Association, is now engaged in preparation for another encounter with the United States Senate finance committee over the 5% "nuisance tax" on mechanical refrigerators—a tax which was imposed in June, 1932, and which expires in June, 1934. At a luncheon last week Mr. Ruthenburg consulted with F. M. Cockrell, publisher of Electric Refrigeration News, on a brief he has drawn up for presentation to the committee. Pictures: (1) Mr. Ruthenburg watches Mr. Cockrell's reactions as the latter studies the brief; (2) Mr. Ruthenburg explains the situation; (3) Mr. Cockrell puts on his glasses and gets down to details; (4) Luncheon is over.

MANUFACTURERS BRIEF OPPOSING REFRIGERATOR TAX IN THIS ISSUE

4-Year Record of Household Refrigerator Sales by Months

Bold face figures: Total sales to dealers by all U. S. manufacturers.
Light face figures: Sales by 11 member companies of the Refrigeration Division of National Electrical Manufacturers Association (Nema).

	1930		1931		1932		1933	
	Monthly Sales	Cumul. Sales	Monthly Sales	Cumul. Sales	Monthly Sales	Cumul. Sales	Monthly Sales	Cumul. Sales
January	**34,000**	**34,000**	**22,700**	**22,700**	**39,400**	**39,400**	**19,400**	**19,400**
Nema Only	28,356	28,356	18,917	18,917	31,527	31,527	16,351	16,351
February	**51,000**	**85,000**	**54,700**	**77,400**	**52,600**	**92,000**	**36,200**	**55,600**
Nema Only	42,362	70,718	45,503	64,420	42,109	73,636	30,422	46,773
March	**84,500**	**169,500**	**96,600**	**174,000**	**91,500**	**183,500**	**59,200**	**114,800**
Nema Only	70,291	141,009	80,320	144,740	73,215	146,851	49,823	96,596
April	**121,000**	**290,500**	**159,300**	**333,300**	**158,300**	**341,800**	**127,400**	**242,200**
Nema Only	100,500	241,509	132,414	277,154	126,620	273,471	107,182	203,778
May	**118,500**	**409,000**	**153,500**	**486,800**	**144,200**	**486,000**	**208,200**	**450,400**
Nema Only	98,621	340,130	127,671	404,825	115,348	388,819	175,119	378,897
June	**93,000**	**502,000**	**122,200**	**609,000**	**163,300**	**649,300**	**208,700**	**659,100**
Nema Only	77,174	417,304	101,492	506,317	130,607	519,426	175,550	554,447
July	**83,000**	**585,000**	**103,800**	**712,800**	**33,500**	**682,800**	**127,300**	**786,400**
Nema Only	69,506	486,810	86,419	592,736	26,794	546,220	107,081	661,528
August	**72,000**	**657,000**	**69,800**	**782,600**	**28,900**	**711,700**	**98,100**	**884,500**
Nema Only	59,680	546,490	58,021	650,757	23,124	569,344	82,495	744,023
September	**62,500**	**719,500**	**53,200**	**835,800**	**38,100**	**749,800**	**72,300**	**956,800**
Nema Only	51,969	598,459	44,262	695,019	30,513	599,857	60,840	804,863
October	**45,000**	**764,500**	**48,100**	**833,900**	**34,100**	**783,900**	**56,700**	**1,013,500**
Nema Only	37,576	636,035	39,999	735,018	27,294	627,151	47,726	852,589
November	**37,000**	**801,500**	**39,600**	**923,500**	**26,300**	**810,200**	**27,900**	**1,041,400**
Nema Only	30,777	666,812	32,879	767,897	21,029	648,180	23,444	876,033
December	**48,500**	**850,000**	**41,500**	**965,000**	**30,100**	**840,300**	**39,000**	**1,080,000**
Nema Only	40,238	707,050	34,459	802,356	24,078	672,258	32,844	908,877

Replacement Market Becoming Important

(*Concluded from Page 1, Column 5*)

sold in 1933 sales to date reach a total of 5,885,000. After making deductions for exports to date, obsolescence and replacement to date, and for stocks in the hands of dealers and distributors as of December, 1933, it is estimated that about 5,465,000 household electric refrigerators are now in use in the United States.

Approximately 55,000 household units were exported during 1933 bringing the cumulative export total to 345,000. Assuming the average life of a household electric refrigerator to be about 10 years, it is estimated that approximately 800,000 units of total sales have become obsolete to date. Stocks in the hands of U. S. dealers and distributors totaled about 75,000 units as of Dec., 31, 1933.

Considering that there are 19,843,724 wired homes in the United States the market saturation at the beginning of 1934 was 23.5 per cent.

A recent survey among public utilities to determine the number of household refrigerators operating on their lines indicates that this wired homes saturation figure represents a fair estimate for the country as a whole. Saturation in the larger cities and towns in most cases exceeds the national average, while it generally falls below in the smaller communities and rural districts.

Although the wired homes saturation is now 23.5 per cent it seems hardly logical to assume that a potential market of 76.5 per cent is available to refrigerator manufacturers. It is a prevalent opinion that many domestic electricity users are not in a satisfactory financial condition to purchase electric refrigeration. The replacement market, however, will undoubtedly become an increasingly important factor.

Considering the average retail price of all household models to be $170, the dollar volume of the 1,080,000 units sold in 1933 amounted to $183,600,000. Retail price has in the past been assumed to be approximately double factory value.

Nema factory value averaged slightly over $83 in 1933, but with an indicated movement away from free installations and the tendency to pass at least some of the freight charges on to the ultimate user during the past year it seems logical to add in an allowance for these factors bringing the retail average price to $170. This average price must merely be considered as an estimate, as there is no way of determining an actual average price.

Total Sales by Years

Annual sales of household refrigerators by all U. S. manufacturers since 1920.

Year	No. of Units	Average Price	Total Value
To 1920	10,000	$600	$ 6,000,000
1921	5,000	550	2,750,000
1922	12,000	525	6,300,000
1923	18,000	475	8,550,000
1924	30,000	450	13,500,000
1925	75,000	425	31,875,000
1926	210,000	390	81,900,000
1927	390,000	350	136,500,000
1928	560,000	334	187,040,000
1929	840,000	292	245,280,000
1930	850,000	275	233,750,000
1931	965,000	258	248,970,000
1932	840,000	195	163,800,000
1933	1,080,000	170	183,600,000
Total	**5,885,000**	...	**$1,549,815,000**

Bureau Estimates Sales At 1,065,105

1933 sales by states, estimated by the Electric Refrigeration Bureau. (Exports are not included.)

	1933 Quota	Estimated Total Sales	Quota Realization
New England Division			**Per Cent**
Connecticut	15,316	17,740	115.8
Maine	6,234	5,699	91.4
Massachusetts	39,027	53,436	136.9
New Hampshire	4,009	3,900	97.2
Rhode Island	6,435	9,177	142.6
Vermont	2,626	2,767	105.3
Eastern Division			
Delaware	1,607	2,343	145.7
Maryland & D. C.	15,944	27,432	172.0
New Jersey	39,021	50,654	129.8
New York	123,949	205,383	165.6
Pennsylvania	68,754	103,564	150.6
East Central Division			
Kentucky	8,934	14,682	164.3
Ohio	51,228	69,328	135.3
West Virginia	6,149	10,207	165.9
Middle West Division			
Iowa	15,232	14,013	91.9
Kansas	11,343	12,145	107.0
Missouri	22,078	37,270	168.8
Nebraska	7,837	8,746	111.5
Pacific Coast Division			
Arizona	2,295	2,418	105.3
California	62,735	62,163	99.0
Nevada	569	1,028	180.6
North West Division			
Idaho	2,582	2,311	89.5
Montana	2,785	3,524	126.5
Oregon	7,893	7,491	94.9
Utah	3,850	4,444	115.4
Washington	14,270	11,807	82.7
South Eastern Division			
Alabama	5,470	9,785	178.8
Florida	7,687	10,575	137.5
Georgia	6,537	11,828	180.9
North Carolina	8,601	14,103	163.9
South Carolina	3,427	5,589	163.0
Tennessee	7,830	9,793	125.0
Virginia	8,733	15,341	175.6
Great Lakes Division			
Illinois	61,455	72,446	117.8
Indiana	22,386	22,863	102.1
Michigan	35,191	33,694	95.7
Wisconsin	20,689	17,984	86.9
North Central Division			
Minnesota	15,809	14,943	94.5
North Dakota	1,996	1,876	93.9
South Dakota	2,558	2,546	99.5
Rocky Mountain Division			
Colorado	6,745	8,541	126.6
New Mexico	1,091	1,724	158.0
Wyoming	1,045	1,408	134.7
Southwestern Division			
Arkansas	3,664	5,553	151.5
Louisiana	6,525	7,587	116.2
Mississippi	2,742	3,327	121.3
Oklahoma	8,346	12,634	151.3
Texas	20,941	37,293	178.0
Totals	**802,170**	**1,065,105**	**132.7**

Summary of Sales by 11 Nema Manufacturers By States for 1933

The following table shows the distribution by states of sales made by 11 members of the National Electrical Manufacturers Association (Nema) for each quarter of 1933. Tables at the bottom of the page show the breakdown by months.

Member companies of the Refrigeration Division of the National Electrical Manufacturers Association reporting sales include Crosley, Frigidaire, General Electric, Gibson, Grigsby-Grunow, Kelvinator, Norge, Servel, Trupar, Universal Cooler, and Westinghouse. Member companies not reporting sales are Apex Electrical Mfg. Co., Merchant & Evans Co., Potter Refrigerator Corp., Stewart-Warner Co., Sunbeam Electric Mfg. Co., Uniflow Mfg. Co., and Rudolph Wurlitzer, Inc.

States and Territories	First Quarter Totals	Second Quarter Totals	Third Quarter Totals	Fourth Quarter Totals	Totals For Year
Connecticut	1,352	7,008	4,451	1,405	14,216
Maine	500	2,319	1,216	445	4,480
Massachusetts	3,922	21,577	11,554	4,094	41,147
New Hampshire	292	1,635	826	315	3,068
Rhode Island	692	4,168	1,781	649	7,290
Vermont	195	1,159	509	200	2,063
New England Total	**6,953**	**37,866**	**20,337**	**7,108**	**72,264**
Delaware	181	1,112	438	142	1,873
Maryland and D. C.	3,607	16,266	8,593	2,452	30,918
New Jersey	3,916	19,430	11,602	5,186	40,134
New York (State)	17,741	67,753	52,438	25,072	163,004
Pennsylvania	7,742	46,354	23,224	5,544	82,864
Eastern Total	**33,187**	**150,915**	**96,295**	**38,396**	**318,793**
Kentucky	1,143	6,761	3,060	776	11,740
Ohio	4,429	30,744	15,871	4,390	55,434
West Virginia	942	7,637	2,566	633	11,778
East Central Total	**6,514**	**45,142**	**21,497**	**5,799**	**78,952**
Alabama	978	4,256	2,003	590	7,827
Florida	657	3,218	3,018	1,565	8,458
Georgia	1,009	6,553	2,583	517	10,662
North Carolina	991	8,283	2,102	705	12,081
South Carolina	584	3,319	1,037	330	5,270
Tennessee	829	4,659	1,670	669	7,827
Virginia	1,604	8,954	3,138	869	14,565
Southeastern Total	**6,652**	**39,242**	**15,551**	**5,245**	**66,690**
Illinois	6,801	30,192	16,453	4,497	57,943
Indiana	1,708	10,925	4,524	1,109	18,266
Michigan	1,676	13,844	7,311	3,331	26,162
Wisconsin	1,213	5,968	2,832	860	10,873
Great Lakes Total	**11,398**	**60,929**	**31,120**	**9,797**	**113,244**
Minnesota	1,651	6,082	3,151	1,067	11,951
North Dakota	152	903	326	118	1,499
South Dakota	222	1,204	399	201	2,026
North Central Total	**2,025**	**8,189**	**3,876**	**1,386**	**15,476**
Iowa	1,329	6,524	2,271	1,085	11,209
Kansas	1,297	5,900	1,875	644	9,716
Missouri	4,623	18,311	6,640	2,038	31,612
Nebraska	695	4,151	1,584	566	6,996
Middle West Total	**7,944**	**34,886**	**12,370**	**4,333**	**59,533**
Arizona	341	950	533	111	1,935
California	5,261	18,129	11,871	5,049	40,310
Nevada	42	367	330	85	824
Pacific Coast Total	**5,644**	**19,446**	**12,734**	**5,245**	**43,069**
Idaho	133	1,105	494	115	1,847
Montana	303	1,644	668	206	2,821
Oregon	590	3,056	1,774	572	5,992
Utah	125	2,427	843	161	3,556
Washington	862	3,109	2,153	507	6,631
Northwestern Total	**2,013**	**11,341**	**5,932**	**1,561**	**20,847**
Colorado	1,078	3,938	1,521	397	6,934
New Mexico	184	733	412	77	1,406
Wyoming	59	739	250	80	1,128
Rocky Mountain Total	**1,321**	**5,410**	**2,183**	**554**	**9,468**
Arkansas	387	2,607	1,226	220	4,440
Louisiana	838	3,103	1,583	546	6,070
Mississippi	246	1,304	872	238	2,660
Oklahoma	1,189	6,241	2,014	655	10,099
Texas	3,803	16,184	7,457	2,510	29,954
Southwestern Total	**6,463**	**29,439**	**13,152**	**4,169**	**53,223**
U. S. Miscellaneous	...	...	...	36	36
Total United States	**90,114**	**442,805**	**235,047**	**83,629**	**851,595**
Total Canada	1,073	3,677	2,074	911	7,735
Other Foreign (Including U. S. Possessions)	5,168	11,221	13,295	19,474	49,158
Total for World	**96,355**	**457,703**	**250,416**	**104,014**	**908,488**

Total Sales of 11 Nema Manufacturers by States for Each Month of 1933

States and Territories	Jan.	Feb.	March	April	May	June
Connecticut	284	460	608	1,438	3,112	2,458
Maine	41	186	273	399	1,020	900
Massachusetts	842	1,332	1,748	4,862	9,225	7,490
New Hampshire	86	82	124	325	653	657
Rhode Island	142	143	407	778	1,632	1,758
Vermont	40	86	69	211	505	443
New England Total	**1,435**	**2,289**	**3,229**	**8,013**	**16,147**	**13,706**
Delaware	39	80	62	281	487	344
Maryland and D. C.	577	1,381	1,649	4,037	5,722	6,507
New Jersey	643	1,076	2,197	4,306	7,723	7,401
New York (State)	3,687	5,584	8,170	15,647	24,828	27,278
Pennsylvania	1,129	2,267	4,346	9,471	18,627	18,256
Eastern Total	**6,075**	**10,688**	**16,424**	**33,742**	**57,387**	**59,786**
Kentucky	145	439	559	1,539	2,534	2,688
Ohio	697	1,607	2,125	6,575	11,306	12,863
West Virginia	223	353	366	1,544	2,891	3,202
East Central Total	**1,065**	**2,399**	**3,050**	**9,658**	**16,731**	**18,753**
Alabama	86	241	651	1,371	1,832	1,053
Florida	149	202	306	743	1,286	1,189
Georgia	125	360	524	1,481	3,129	1,943
North Carolina	131	211	649	1,879	4,049	2,355
South Carolina	94	94	396	795	1,650	874
Tennessee	163	226	440	1,137	2,274	1,248
Virginia	181	513	910	1,957	4,049	2,948
Southeastern Total	**929**	**1,847**	**3,876**	**9,363**	**18,269**	**11,610**
Illinois	999	1,772	4,030	6,885	11,468	11,839
Indiana	344	589	775	2,044	3,824	5,057
Michigan	283	485	908	2,407	5,413	6,024
Wisconsin	237	318	658	1,403	2,132	2,433
Great Lakes Total	**1,863**	**3,164**	**6,371**	**12,739**	**22,837**	**25,353**
Minnesota	139	587	925	1,562	2,242	2,278
North Dakota	22	36	94	151	403	349
South Dakota	10	107	105	199	529	476
North Central Total	**171**	**730**	**1,124**	**1,912**	**3,174**	**3,103**
Iowa	276	327	726	1,369	2,362	2,793
Kansas	200	472	625	1,594	1,971	2,335
Missouri	526	1,510	2,587	4,984	6,341	6,986
Nebraska	111	180	404	877	1,760	1,514
Middle West Total	**1,113**	**2,489**	**4,342**	**8,824**	**12,434**	**13,628**
Arizona	78	114	149	383	352	215
California	732	1,508	3,021	5,770	5,135	7,224
Nevada	7	14	21	97	128	142
Pacific Coast Total	**817**	**1,636**	**3,191**	**6,250**	**5,615**	**7,581**
Idaho	46	20	67	175	422	508
Montana	14	53	236	417	582	645
Oregon	153	92	345	919	929	1,208
Utah	5	28	92	470	762	1,195
Washington	73	360	429	803	1,156	1,150
Northwestern Total	**291**	**553**	**1,169**	**2,784**	**3,851**	**4,706**
Colorado	372	224	482	1,090	1,320	1,528
New Mexico	60	53	71	194	273	266
Wyoming	5	14	40	146	315	278
Rocky Mountain Total	**437**	**291**	**593**	**1,430**	**1,908**	**2,072**
Arkansas	115	126	146	643	1,080	884
Louisiana	134	269	435	618	1,396	1,089
Mississippi	33	85	128	302	583	419
Oklahoma	77	449	663	1,903	2,312	2,026
Texas	449	1,300	2,054	4,153	6,492	5,539
Southwestern Total	**808**	**2,229**	**3,426**	**7,619**	**11,863**	**9,957**
Total United States	**15,004**	**28,315**	**46,795**	**102,334**	**170,216**	**170,255**
Total Canada	181	359	533	847	1,463	1,367
Other Foreign (Including U. S. Possessions)	1,026	1,643	2,499	3,850	3,443	3,928
Total for World	**16,211**	**30,317**	**49,827**	**107,031**	**175,122**	**175,550**

States and Territories	July	Aug.	Sept.	Oct.	Nov.	Dec.
Connecticut	2,049	1,462	940	823	150	432
Maine	441	514	261	233	41	171
Massachusetts	4,243	4,170	3,141	2,485	430	1,179
New Hampshire	333	346	147	171	38	106
Rhode Island	648	725	408	366	99	184
Vermont	223	173	113	108	23	69
New England Total	**7,937**	**7,390**	**5,010**	**4,186**	**781**	**2,141**
Delaware	163	174	101	67	22	53
Maryland and D. C.	2,872	3,108	2,613	1,313	359	780
New Jersey	4,435	3,997	3,170	2,742	738	1,706
New York (State)	20,098	16,320	16,020	13,308	5,394	6,370
Pennsylvania	11,054	7,687	4,483	2,182	1,018	2,344
Eastern Total	**38,622**	**31,286**	**26,387**	**19,612**	**7,531**	**11,253**
Kentucky	1,743	875	442	322	57	397
Ohio	7,351	5,353	3,167	1,797	670	1,923
West Virginia	1,249	852	465	368	82	183
East Central Total	**10,343**	**7,080**	**4,074**	**2,487**	**809**	**2,503**
Alabama	779	697	527	340	69	181
Florida	952	1,029	1,037	811	264	490
Georgia	1,275	698	610	193	31	293
North Carolina	839	733	530	336	102	267
South Carolina	307	415	315	172	36	122
Tennessee	862	430	378	356	131	182
Virginia	1,378	934	826	463	136	270
Southeastern Total	**6,392**	**4,936**	**4,223**	**2,671**	**769**	**1,805**
Illinois	7,696	5,180	3,577	2,232	902	1,363
Indiana	2,432	1,297	795	359	183	567
Michigan	3,213	2,037	2,061	1,205	693	1,433
Wisconsin	1,490	781	561	388	131	341
Great Lakes Total	**14,831**	**9,295**	**6,994**	**4,184**	**1,909**	**3,704**
Minnesota	1,447	1,050	654	432	239	396
North Dakota	177	100	49	35	27	56
South Dakota	212	129	58	53	67	81
North Central Total	**1,836**	**1,279**	**761**	**520**	**333**	**533**
Iowa	1,258	585	428	413	203	469
Kansas	1,175	406	294	232	177	235
Missouri	3,717	1,738	1,185	848	290	900
Nebraska	867	410	307	159	124	283
Middle West Total	**7,017**	**3,139**	**2,214**	**1,652**	**794**	**1,887**
Arizona	344	94	95	41	9	61
California	4,492	4,930	2,449	1,940	1,274	1,835
Nevada	165	144	21	53	10	22
Pacific Coast Total	**5,001**	**5,168**	**2,565**	**2,034**	**1,293**	**1,918**
Idaho	264	187	43	60	19	36
Montana	356	271	41	69	17	120
Oregon	803	650	321	202	34	336
Utah	456	281	106	80	15	66
Washington	1,038	799	316	283	132	92
Northwestern Total	**2,917**	**2,188**	**827**	**694**	**217**	**650**
Colorado	754	600	167	132	74	191
New Mexico	242	127	43	17	10	50
Wyoming	141	91	18	22	15	43
Rocky Mountain Total	**1,137**	**818**	**228**	**171**	**99**	**284**
Arkansas	677	340	209	65	34	121
Louisiana	560	605	418	225	110	211
Mississippi	343	340	189	109	44	85
Oklahoma	1,366	346	302	90	100	465
Texas	3,587	2,120	1,750	1,028	393	1,089
Southwestern Total	**6,533**	**3,751**	**2,868**	**1,517**	**681**	**1,971**
U. S. Miscellaneous	...	...	...	13	5	18
Total United States	**102,566**	**76,330**	**56,151**	**39,741**	**15,221**	**28,667**
Total Canada	852	736	486	347	355	209
Other Foreign (Including U. S. Possessions)	3,663	5,429	4,203	7,638	7,868	3,968
Total for World	**107,081**	**82,495**	**60,840**	**47,726**	**23,444**	**32,844**

What the Dealer himself has to say about the

GENERAL ELECTRIC REFRIGERATOR FRANCHISE

"Quality Line Sells Better"

"Excellent Profit on a Small Investment"

"Much Success Due to Public Preference for G-E"

"G-E Kitchen Step-by-Step Plan Provides Immediate Sales and Builds a Worthwhile Prospect List"

"Tremendous Market for G-E Ranges and Dishwashers"

"Protection Policy on Price Reduction and Obsolesence a Decided Help"

"Controlled Plan of Advertising Most Acceptable and Practical"

TELEPHONE, NORTH 710

HARRY H. HENRY

GENERAL ELECTRIC Refrigerator

794 FIFTH AVENUE
NORTH TROY, N. Y.
October 26, 1933

A. Wayne Merriam, Inc.
108 Erie Boulevard
Schenectady, N. Y.

Gentlemen:

In reply to your letter of October 23rd in regard to how we feel about the General Electric set-up in general I must say that we are more than pleased with the results this year. What with competition slashing prices and with the general drop in prices on all commodities we feel that we have been in a fortunate position inasmuch as we have been handling a line which held up to a standard of quality rather than depending on a low price for volume. I am certainly convinced after this season's results that the buying public is primarily interested in quality.

We have exceeded our 1932 sales volume by a good margin and show an excellent profit for the small amount of money that it is necessary to invest in this business. I feel that one of the greatest attributes to the success we have had has been due to the general public preference for the General Electric refrigerator. I think one of the finest sales promotion plans that has ever been presented to me is the step by step plan of selling the complete General Electric kitchen. As I see it this plan provides for immediate sales of major appliances and also provides a worthwhile prospect list for the other appliances that go to make up the complete General Electric kitchen. I have only recently become aware of the fact that there is a tremendous market for ranges and dishwashers. In some instances a General Electric range or a General Electric dishwasher has been the first major appliance to be used in the kitchen.

I have found that a good floor display is a decided help in actually closing sales, and as a result I have tried to keep my display attractive and adequate at all times. Your policy covering protection in case of price reduction and obsolesence makes it possible for me to do this.

I think that your controlled plan of advertising is the most acceptable and practical advertising set-up offered by any distributor or manufacturer, and your own cooperation is greatly appreciated.

Very truly yours,

Harry H. Henry

H. H. Henry/t

COMING from the G-E refrigerator dealer himself, this inspirational message of Mr. Henry's is *first hand* information on the profit possibilities of the General Electric Franchise. Many letters on file from other G-E retailers are equally enthusiastic. North Troy, N. Y., the location of G-E Dealer Henry's store, is typical of hundreds of communities throughout the country where the G-E franchise offers a permanent, profitable business.

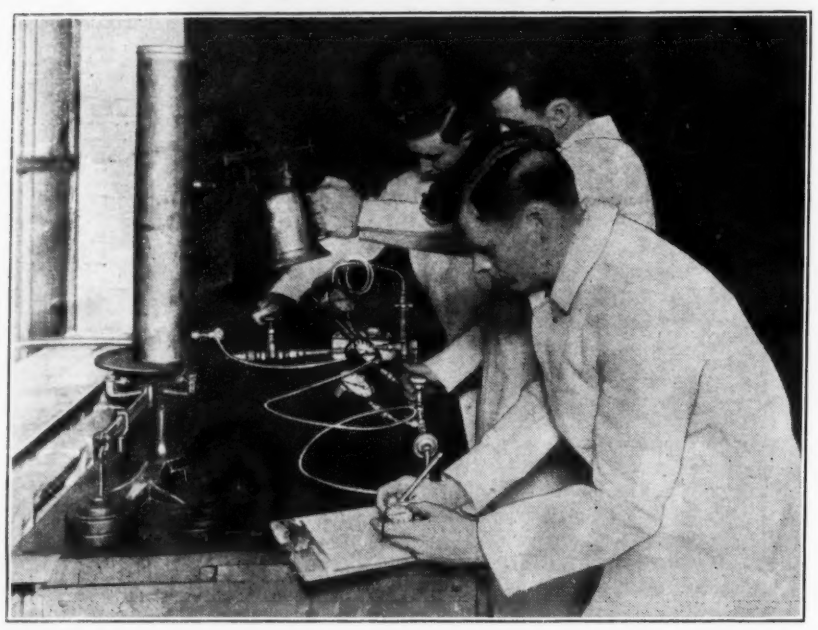
GENERAL ELECTRIC IS NOW APPOINTING NEW DEALERS IN OPEN TERRITORIES

However large or small your display facilities may be, if you measure up to G-E standards, the franchise in your territory will give you a progressive and profitable business–starting NOW. Write or wire for details. General Electric Company, Specialty Appliance Sales Department, Section DF22, Nela Park, Cleveland, Ohio.

GENERAL ELECTRIC

REFRIGERATORS • RANGES • DISHWASHERS

Arrangement of Apparatus



Testing expansion valves in the Fedders laboratory. Rear to front: Ben Rhodes, assistant chief engineer; Jack Glover; and Carl Ahlheiser.

Sherman to Head Russ Cream Freezer Sales

CLEVELAND—C. Q. Sherman has resigned as sales manager of the Cream-O'Matic division of the Grand Rapids Store Equipment Corp. to become manager of the ice cream freezer division of the Russ Soda Fountain Co. here.

Russ now owns and controls all patterns, jigs, dies, and tools of what was formerly the Cream-O'Matic freezer, and will refine the product.

Adelson Addresses Two St. Louis Meetings

CLEVELAND—J. S. Adelson, chief metallurgist of Steel & Tubes, Inc. addressed two meeting of electrical men at Hotel Statler in St. Louis, Feb. 6 on "The Manufacture of Electric Welded Tubing and Pipe." One meeting at noon was attended by the St. Louis Electrical Board of Trade.

The Industrial Engineers section heard Mr. Adelson speak at the evening session.

Expansion Valves Tested by Fedders

BUFFALO—Results of an extensive series of capacity tests on thermostatic expansion valves, conducted in the research laboratory of Fedders Mfg. Co. here, have just been released by J. Askin, chief engineer of the company.

A curve summarizing the tests is published at right, enabling an engineer to obtain the capacity of a thermostatic valve at various pressure differentials with either a .156 or a .093-in. orifice, using methyl chloride, sulphur dioxide, or Freon.

The photograph at left shows the arrangement of the apparatus and the method of conducting the tests. In it can be seen the drum of refrigerant, the balance scale on which the drum of refrigerant sets, a torch for maintaining a constant pressure within the drum, a flexible liquid line (which did not interfere with the accurate measurement of the weight of refrigerant made on the scale), a liquid filter, a gauge, a shut-off valve, another gauge, a thermostatic expansion valve with the bulb immersed in an ice water solution (maintaining a superheat temperature of 32° F. at the bulb), a gauge to indicate the back pressure of the valve, a back pressure gate valve (which regulated the pressure at the outlet of the valve), and a line leading outdoors, where the refrigerant was discharged.

In conducting these tests, the liquid valve was opened up wide, the torch was applied to maintain a constant pressure on the tank, the balance was set for a predetermined weight loss in the tank (say one pound), and when the pound of refrigerant went through the valve, the time was recorded with a stop watch.

The back pressure was maintained by manipulating the gate valve at the right. Thus a constant inlet pressure to the valve, a constant back pressure of the valve, and a constant superheat temperature at the bulb could be maintained by stirring the ice water in which the bulb was immersed.

The readings were taken with the valve wide open, that is, with the adjusting thumb nut at the top of the power element completely opened up by turning it in a clockwise direction.

To be absolutely sure that the valve was wide open when this method of adjustment was made, this was subsequently checked by removing the power element of the thermostatic expansion valve, placing a cap on the valve and inserting a positive acting screw which opened up the valve wide.

These readings of flow checked with the readings taken when the power element was connected to the valve and the bulb immersed in 32° F. ice water, and the adjusting thumb nut turned clockwise as far as it would go.

Valves having the following orifices were tested: .093-in. diameter and .156-in. diameter. Methyl chloride, sulphur dioxide, and Freon were the refrigerants employed.

Inlet Pressures

With sulphur dioxide refrigerant, the inlet pressures to the valve were kept at 42 lbs. and 75 lbs. With Freon refrigerant, the inlet pressures were 80 lbs. and 120 lbs. With methyl chloride refrigerant, the inlet pressures were 68 lbs. and 110 lbs.

The back pressures at each inlet pressure were varied accordingly and the flow of refrigerant recorded. From the flow of refrigerant inlet pressure and outlet pressure, the tons of refrigeration (per 24 hours) was computed.

Making further computations, it was observed that apparently the flow of liquid refrigerant through a valve depended upon the pressure differential between both sides of the valve, Mr. Askin reports.

A convenient curve, showing the complete summary of the tests above, is shown herewith, enabling one to obtain the capacity of either of the valves with any refrigerant and with any pressure differential.

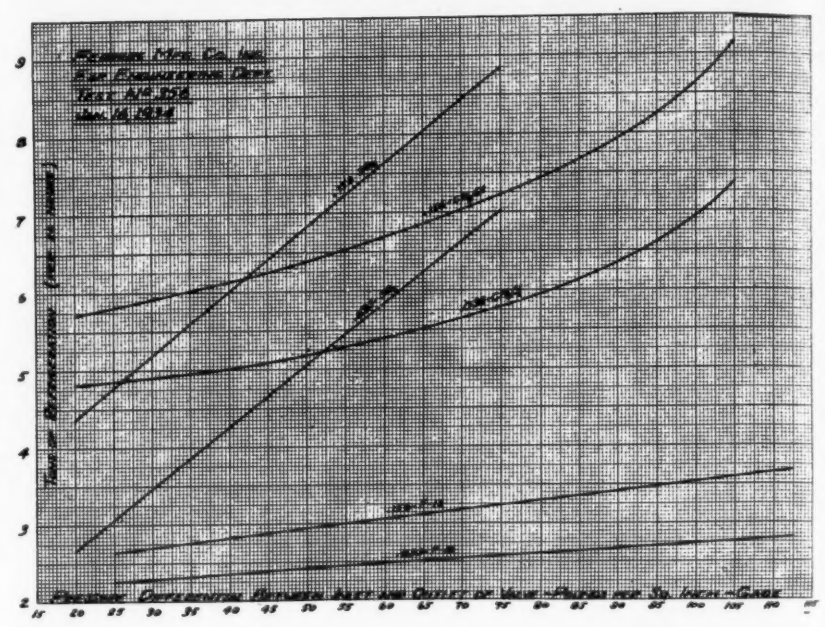
For example, suppose methyl chloride is the refrigerant. Assume a discharge pressure of 100 lbs. and a suction pressure of 10 lbs., giving a pressure differential of 90 lbs. Assume the orifice is .093 in. The pressure differential becomes 90 lbs., and the capacity of the valve is 6.35 tons per 24 hours.

It is necessary to bear in mind that this capacity represents the capacity through a valve without any friction loss in the evaporator coils, Mr. Askin points out. Allowance should be made for this friction loss.

"Also, the capacity represents the full wide open capacity of the valve with a superheat temperature at the bulb of the thermostatic power element of 30° F.

"It is seldom that a valve is used in its wide open position, and therefore allowance should be made for this also. Oil, when mixed with the refrigerant, acts as an inert fluid, so far as obtaining refrigeration is concerned, and allowance should be made, depending upon the amount of oil circulated," he states.

Valve Capacity Test



Fedders tests of capacity of thermostatic valves (ordinate) at various pressure differentials between inlet and outlet of valve (abscissa), for sulphur dioxide, methyl chloride, and Freon.

Pierce Laboratory Uses Conditioners

NEW YORK CITY—Air-conditioning apparatus is being used both to create almost any desired outside temperature and humidity conditions and to "condition" test rooms in the laboratory of the John B. Pierce Foundation at New Haven, Conn., directors of the laboratory explained to members of the A.S.H.V.E. at their convention here last week.

The foundation was established under the will of the late John B. Pierce and as specified in the will, the object of the foundation "is the promotion of research, education, technical or scientific work in the general field of heating, ventilating, and sanitation for the increase of knowledge to the end that the general hygiene and comfort of human beings and their habitations may be advanced."

The laboratory is a two-story brick structure, with basement. The basement is occupied by air-conditioning machinery and animal rooms; the first floor by air-conditioning machinery, workshop, and offices; and the second floor by test rooms and a laboratory.

Heart of the installation is a two-room frame house completely surrounded, above and below and on all four sides by shell spaces. In these shell spaces any desired temperature and humidity can be produced.

The six shell spaces are all insulated on the outside by laminated cork of standard construction and are separated from each other by walls of Portland cement and cork. Entrance to all shell spaces is through standard refrigerator doors, 6 in. thick. Temperature and humidity of each of the

(*Concluded on Page 5, Column 1*)

Consolidated Gas Starts $3 Annual Service Plan

NEW YORK CITY—Users of Electrolux refrigerators on gas lines of the Consolidated Gas Co. here are being asked to subscribe to a $3 annual maintenance service agreement under which the company furnishes replacement parts and service for refrigerators on which the two-year guarantee has expired. Heretofore parts were furnished free.

A PLAN THAT BRINGS

PROSPECT, REFRIGERATOR AND SALESMAN

together IN YOUR STORE

The Complete Refrigerator
offers these, and a score of other, great sales advantages

LEN-A-DOR—Leonard's famous self opening, step saving door.

Cabinets of beautiful design, superior finish and quality construction.

Planned interior, with unusual shelf area and storage capacity.

New serving tray, sliding and adjustable shelves.

Improved dairy basket, with bottle container; vegetable crisper; electric light.

12 freezing speeds, extra fast freezing tray, cold chest, "vacation temperature," ice tray lifter.

All-porcelain interior, all-porcelain cooling unit, refrigeration mechanism backed by 20 years' experience.

IT is in the showrooms of dealers that electric refrigerator sales are most easily made. Prospect, product and salesman in the same place at the same time.

Leonard now offers you a plan that creates this ideal selling condition, bringing prospects in really large numbers *into your store*. Interested prospects—women who come to see and talk about electric refrigeration.

This is a tested, proven plan—workable, practical. In one city of 13,000, it brought 300 women into the Leonard dealer's place of business on a specified day. It drew 125 to another dealer's store in a town of 3600. It will repeat these results month after month—for *you*, if you wish. Coupled with the new Leonard line—a product of outstanding beauty and quality—this plan is going to do great things for Leonard dealers in 1934. Don't you think you ought to know more about it?

We will gladly give you all the details, and at the same time tell you many interesting facts about the new Leonard Electrics—11 beautiful models (5 all-porcelain), a complete line of plug-in merchandise that covers 98½% of home refrigeration needs. Write or wire now. LEONARD REFRIGERATOR COMPANY, *14256 Plymouth Road, Detroit, Michigan.* (599)

LEARN ABOUT THE NEW LEONARD STORE SELLING PLAN

Pierce Laboratory Uses Conditioners

(*Concluded from Page 4, Column 5*)

six shell spaces is independently controlled by conditioned air, supplied through ducts.

Five conditioning chambers supply air for the shell spaces, each side space being supplied by an individual chamber, with the ceiling and floor spaces being supplied by a single chamber. Each conditioning chamber includes a dry-coil refrigerating unit, and a spray chamber for humidification.

Refrigerating Units

The refrigerating unit is a standard ammonia compressor. The spray chamber has four spray nozzles provided with recirculated water by a centrifugal pump, and a small steam heating unit for raising the temperature of the water.

After leaving the conditioning chamber, the air passes to a vertical supply duct in which is located the air heater. This is of fin-type construction with approximately 80 sq. ft. of steam radiation capacity.

Dry-bulb temperature is controlled by steam valves governed by thermostats located in the return air ducts. As heat is called for in the shell spaces, one or both of the two steam valves connected with the air heater will automatically open. As refrigeration is required, these steam valves automatically close and the ammonia compressor is started at a speed corresponding to the load requirements.

Humidity Control

Humidity is controlled by humidistats located in the return air ducts. The humidistats govern the temperature of the spray water, and the proportion of recirculated air which passes through the spray chamber. When an increase of humidity is desired a larger proportion of air is passed through the spray chamber, and the steam supply to the water heater is increased.

When a decrease is called for, a larger proportion of the recirculating air is by-passed around the spray chamber and the remainder of the air is dehumidified by passing through the refrigeration chamber.

Designers of this equipment guarantee a minimum average dry-bulb temperature of 0° F. in any part of the shell space with a maximum summer outside atmospheric temperature not over 90° F. dry bulb and 75° F. wet bulb and with inside test room temperature not over 85° F.

They also guarantee dew-point temperatures from 40° F. to 95° F., the maximum variation in wet-bulb temperature at the point of control to be not over .5° F. plus or minus. This latter covers the dry-bulb range from 50 to 100° F., and will hold regardless of outside temperature and humidity conditions.

In the laboratory on the second floor adjacent to the test rooms is a large panel board. One-half of this panel board is occupied by remote-control switches which govern the air-conditioning equipment for the shell spaces.

POTTER
ANNOUNCEMENT
Feb. 21st!

Check these features of the 1934 Care-free CAPACITOR-MOTOR

See why it's the greatest motor value ever offered for domestic refrigerators

RUBBER MOUNTING ✓

END-PLAY SILENCER ✓

*BELT TIGHTENER ✓

CAST-ALUMINUM ROTOR ✓

LARGE OIL CAPACITY ✓

BUILT-IN TERMINAL BOX ✓

DRIP-PROOF END SHIELDS ✓

NRA MEMBER U.S. WE DO OUR PART

Never before has one motor had so many features that help you sell refrigerators

RUBBER MOUNTING...The 1934 "care-free" motor gives you smooth, cushioned power, with new quietness. It runs in a mounting of springy, live rubber (treated with a compound which makes it impervious to oil). It combines excellent sound-isolating qualities with good shaft alignment and excellent flexibility. It is designed to eliminate objectionable noise caused by torque vibration and by endwise and radial out-of-balance.

END-PLAY SILENCER... Consisting of a durable spring-steel plate built in as an integral part of each end shield, this device eliminates end-play noise by cushioning oscillations of the rotor in either direction longitudinal to the shaft—another reason why the "care-free" motor is quieter.

***BELT TIGHTENER (optional)**... This new, radically different belt tightener depends on torque and not on springs for its action. It maintains just sufficient tension to prevent slippage, because the tension is proportional to the load. It eliminates service calls for belt tightening or premature replacing. Consider the saving in service costs alone.

CAST-ALUMINUM ROTOR... The squirrel-cage rotor winding is a one-piece, solid aluminum casting, formed by a unique, high-pressure method. This assures a uniform, well-balanced rotor with permanent magnetic characteristics.

LARGE OIL CAPACITY...Large, improved, wool-packed bearings, with oil throwers and returns which conserve the lubricant and assure a constant supply of fresh, clean oil. Lubrication is required only once a year.

BUILT-IN TERMINAL BOX... Lowers assembly costs by eliminating all necessity for splicing and soldering leads. Three binding posts are provided for direct connection of the line and cold-control leads.

DRIP-PROOF END SHIELDS...These protect the motor from falling dirt or water and give the "care-free" motor that modern, streamline appearance.

Don't fail to see the CARE-FREE CAPACITOR-MOTOR before you buy. Everything about it spells lower service costs and greater customer satisfaction. Also, to insure unit responsibility for the electric equipment on your refrigerator, order G-E cold-control units, and cable, with the motor. For complete information, address General Electric, Dept. 6A-201, Schenectady, N. Y.

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GENERAL ELECTRIC

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Air Conditioning For Homes

IS there a profitable market for the sale of air-conditioning equipment to homes in the coming year? A good many manufacturers are trying to determine the answer to that question today. Some of the most important fabricators of equipment which perform certain air-conditioning functions believe that they know the answer, and they are preparing to do their first real job of promotion directed to the home market in 1934.

To do an honest and complete job of air conditioning for a better class home—that is, air conditioning as the engineers are thinking of it today, which means to give the owner complete, automatic, year-round control of the temperature, humidity, circulation, and cleanliness of the air he breathes in his home—would cost the householder several thousand dollars.

Moreover, he might encounter irritating difficulties in adapting his present house to an air-conditioning installation. He might even have to move out for a time, while his home is being fitted up with a system of ducts and other equipment. ELECTRIC REFRIGERATION NEWS, for instance, is at present engaged in remodeling a large residential building for use as an office. The installation of air-conditioning equipment in this fine old home is requiring many weeks, a considerable expenditure of money, and a high degree of mechanical ingenuity. It is no small job to fit the necessary ducts into existing walls without defacement or injury to the structure.

Does it appear, then, that the market for home air conditioning is limited to the upper-income brackets? For the complete job, yes. If the owner goes to Palm Beach or Miami or on a Mediterranean cruise in the winter, the installation could be made in his absence. Chances are also reasonably good that this class of home owner would have the ready cash to pay for the job. But, the air-conditioning contractor who seeks this market will have to give convincing evidence of his ability to perform such surgery on a fine piece of property before he can expect to be entrusted with the responsibility.

This small group of prospects certainly isn't a mass market. But it is very definitely a market, for almost every family on this "level" of existence is already pretty well acquainted with, and sold on, air conditioning—having encountered it on crack trains, in offices, in fine shop and salons, theaters, hotels, and good restaurants.

Added to this group is the speculative house-building market. True, the number of prospects in this class has been practically zero during the last few years. But many analysts of the current situation predict that home consruction activities will start on the upgrade soon. In that event, the market for complete air conditioning should expand with some rapidity.

It seems a foregone conclusion that any new home not completely air conditioned will be obsolete before the mortgage matures, for public consciousness of this popular fruit of scientific investigation is tremendous indeed. Moreover, successful speculative builders are always on the lookout for distinctive features which will take their homes out of ruck of price competition. Air conditioning is undoubtedly their newest and best bet in this regard.

Perhaps the most active prospect group right now is that consisting of bond and mortgage holders, receivers and trustees who have money to spend on anything which will bring their dormant properties back into income-producing condition.

We still don't have a prospective mass market for air conditioning. Moreover, a complete air-conditioning installation is not yet susceptible to the mass production methods which must inevitably accompany mass selling. It is an intricate engineering job, and each installation is different from every other.

If we remove the word, "complete," from the phrase air-conditioning installation, we have another picture and another story. Room coolers and humidifiers, while not exactly "package" merchandise yet, can be installed by the service men connected with ordinary refrigeration dealers and distributors, providing they have taken the short training courses offered by manufacturers. And the prices of these devices which do a *partial* air-conditioning job are not out of reach for the middle-class home owner.

Room coolers (both mechanical and ice) are now pretty far along in their development. And you don't need to spend a small fortune to put one into a room which needs cooling badly in hot weather—a few hundred dollars will turn the trick. The master bedroom is a popular place for a room cooler. At night the occupants are comfortable. During the day, while the husband is at the office, the wife can work or read there. The rest of the house can stay hot. Hay fever sufferers find a single room equipped with a unit cooler a great relief.

Humidifiers for the winter are even simpler and less expensive. Dozens of types and makes are on the market, and all have the twin advantages of low first cost and low upkeep. For a single room a humidifier of small capacity can be obtained at a price equivalent to that of a decent radio. At reasonably higher cost a humidifying system for the whole house—either a motor-driven unit or an integral part of the heating system—can be purchased.

These humidifiers vaporize water into the air, make rooms more comfortable, and prevent colds, which are caused so frequently by the low humidity found indoors in the winter. They are highly popular, and are finding a ready market.

Still other devices which do a *partial* air-conditioning job include noise silencers (perhaps more important for offices than for homes), and air filters, which are invaluable for hay fever sufferers.

For room coolers and humidifiers there should be—and several manufacturers are backing that assumption with big sums for promotion in 1934—a good market in the coming year. And the specialty distributor needn't hire a corps of highly specialized engineers to get into the business and take his share of the profits. For the sake of protecting his future air-conditioning business, however, he should be scrupulously honest in advertising the products he has for sale. If his product will do only *part* of the air-conditioning job, he should not lead gullible prospects into believing it will do the *whole* job.

If these devices for partial air conditioning are properly explained to buyers, they should be very helpful in educating the public to an understanding and appreciation of the functions and benefits of complete air conditioning. Intelligent promotion will result in paving the way for future expansion of the market while dishonest selling will only lead to public confusion.

Sooner or later it appears inevitable that the best of the specialty distributors will get into the complete air-conditioning business. Some of them are preparing for it now by taking on oil burner lines and studying heating and ventilating. A few others are already in the business. Air conditioning for homes is no longer something looming up on a distant horizon. It seems to be here already.

Liquid Cooler's Planner

WILLIAM R. CLARK
New general manager of Liquid Cooler Corp. prepares for step-up in production.

Liquid Cooler Plans Increased Production

(*Concluded from Page 1, Column 2*)

of the Temprite cooler line from the standpoint of operating results. Beer is delivered from the largest cooler at a pressure and temperature identical to that delivered from the smallest model. All coolers are now designed to operate uniformly at various keg pressures.

The new Temprite cooler models have also been made suitable for either beer or water cooling, thus eliminating the special series built last year for water-cooling purposes only.

Another innovation which has evolved from the laboratory activity is a new method of applying block tin to the inside of the beer coils so that block tin is the only metal which beer touches in its journey through the cooler.

The new "line production" of Temprite coolers will be carried out on a group of assembly benches which form a great "square" occupying nearly one entire floor of the plant. Inside the square have been placed assembly racks in which the various parts making up the cooler are stocked.

Movement along the assembly line is facilitated by placing each unit on a lightweight aluminum dolly fitted with castors.

In the first assembly operation the beer coils are soldered to the top plate of the unit. This section of the cooler then moves to a water tank, where it is subjected to a high pressure test for any possible leaks.

From this test the unit moves to the next assembly operation, in which the bucket-type float and float valve assembly are assembled to the unit and the entire section placed in the outer shell of the cooler.

Temperature control valves are assembled on a bench which is not part of the continuous production line. After the valves have been completed they are brought over to the assembly line and connected to the units.

After the valves have been connected, the unit is placed in a dehydrating oven to remove all moisture. After removal from the ovens and while still hot the unit is given a refrigerant test under 100 lbs. pressure.

From this point the units move to the test racks. Two test racks have been set up, one for jobs which will employ sulphur dioxide as the refrigerant, the other for coolers using methyl chloride and Freon.

Each rack has a thermostatically controlled water supply which is used in tests made to check the capacity of the cooler. A sight glass on the line returning the refrigerant to the compressor enables the operator to check the nature of the refrigerant as it leaves the cooler.

On this final test the temperature control valve is set for a minimum temperature of 36° F. and the cap is soldered shut. The screw adjustment will then permit the user to set the temperature at any point between 36° F. and 43° F. Valves will be set at any other temperature upon request, but will not be set lower than 36° F. for water cooling, according to Chief Engineer McLaughlin.

The new test racks will take care of 100 units a day, declares General Manager Clark.

In the assembly operation each cooler is given three tests for leaks, two tests for pressure drop in the beverage coil, and a complete capacity test with a temperature differential of 80° F. to 40° F., Mr. Clark points out.

After the capacity tests the units are naturally very cold, and are allowed to heat up to a temperature of about 100° F. before getting their outer finish of aluminum paint in a spray paint booth.

Frigidaire Meetings To Begin This Month

(*Concluded from Page 1, Column 1*)

R. W. Pocock, public utilities division.

This group will open at Denver, and visit Salt Lake City on the way to the coast. Other meetings will be in Los Angeles, San Francisco, Portland, Ore., Seattle, Spokane, Billings, and Minneapolis-St. Paul.

Eastern swing will be made by a crew under J. J. Nance, manager, air-conditioning division. His associates will be: Frank C. Lyons, director of education, air-conditioning divison; G. E. Durban, assistant manager, public utilities division; J. B. Breen, sales promotion department; C. J. Allen, eastern regional household sales supervisor; and L. J. Strain, sales staff.

The group will visit Cleveland, Rochester, Pittsburgh, Boston, New York City, Philadelphia, Washington, D. C., Norfolk, and Roanoke.

McElhinny Heads Crew

W. D. McElhinny, manager, commercial division, will lead the swing through the middle west, accompanied by Earl D. Doty, advertising manager; C. E. Quigley, beverage cooling division manager; D. T. Hayward, east central regional household sales supervisor; A. C. Frieman, east central regional commercial sales supervisor; and W. F. Switzer, marketing analysis division.

They will visit Cincinnati, St. Louis, Wichita, Kansas City, Omaha, Sioux City, Chicago, Detroit, and Indianapolis.

Through the south will go a crew led by Lee A. Clark, manager, sales promotion department. With him will be F. W. Beecher, western regional household sales supervisor; J. W. Thiele, sales promotion department; R. L. Winegarner, north central regional saleshold sales supervisor; J. F. Cain, southeastern regional household sales supervisor; and O. W. Wolf, air-conditioning sales department.

This group will visit Chattanooga, Atlanta, Tampa, New Orleans, Houston, San Antonio, Dallas-Fort Worth, Oklahoma City, and Memphis.

Ask Labor Clause in Nema Division Codes

(*Concluded from Page 1, Column 5*)

try, Dr. Schurz pointed out, is one in which great variations exist because of its broad scope and consequently general labor provisions had to be drawn to meet the most extreme conditions.

It is now believed, labor's representative declared, that more equitable provisions could be made if supplemental codes were considered in the light of labor problems peculiar to the individual divisions of the industry. Such provisions in the supplemental codes would apply to both hours of labor and hourly wage rates.

At the hearings the Consumers' Advisory Board entered objections to the "open price" clause of the code, in line with their general attack on open-price provisions in all codes.

Agreement on any changes in the code may be reached Wednesday, Feb. 14 at a post-hearing conference between Deputy Administrator H. O. King, the code committee of Nema, and the various advisors.

Approximately 150 persons attended the rehearing last week. Nema was represented by the code committee, which includes G. W. Mason, J. M. Tritle, Clarence L. Collens, F. C. Jones, F. R. Fishback, and P. B. Postlethwaite. The Refrigeration Division of Nema was represented by W. F. Armstrong, Thomas Evans, and Louis Ruthenburg.

New Production Chief

GEORGE SHELDRICK
Mr. Sheldrick was recently elected vice president of Universal Cooler Corp. in charge of manufacturing

TAX BRIEF IS SENT TO HOUSE WAYS & MEANS COMMITTEE

* * *

Industry Submits Its Case Against Inclusion In Excise Tax Schedule

The following brief, prepared by Louis Ruthenburg, consultant to the refrigeration division of National Electrical Manufacturers' Association, deals with the manufacturers' excise tax on electric household refrigerators which was imposed in June, 1932, and which will lapse in June, 1934, unless continued in the tax schedules now being considered in Congress. The brief has been submitted to Representative R. J. Doughton, chairman of the House Ways and Means Committee, with the request that it be considered before the excise tax on electric refrigerators is included in the schedule now under consideration.

The mechanical household refrigeration industry is here represented by a committee of the Refrigeration Division of the National Electrical Manufacturers Association. The members of this division are as follows:

Apex Electrical Mfg. Co., Cleveland, Ohio
Crosley Radio Corp., Cincinnati, Ohio
Frigidaire Corp., Dayton, Ohio
General Electric Co., Cleveland, Ohio
Gibson Electric Refrigerator Corp. Greenville, Mich.
Grigsby-Grunow Co., Chicago, Ill.
Kelvinator Corp., Detroit, Mich.
Leonard Refrigerator Co., Detroit, Mich.
Merchant & Evans Co., Philadelphia, Pa.
Norge Corp., Detroit, Mich.
Potter Refrigerator Co., Buffalo, N. Y.
Servel, Inc., Evansville, Ind.
Stewart-Warner Corp., Chicago, Ill.
Sunbeam Electric Mfg. Co., Evansville, Ind.
Trupar Mfg. Co., Dayton, Ohio
Uniflow Mfg. Co., Erie, Pa.
Universal Cooler Corp., Detroit, Mich.
Westinghouse Electric & Mfg. Co. Mansfield, Ohio
Rudolph Wurlitzer Mfg. Co. North Tonawanda, N. Y.

Members of this association made and sold 80 per cent of all electrical household refrigerators in 1932, and are responsible for approximately 90 per cent of current production. They comply with the provisions of the National Industrial Recovery Act, under the Code of Fair Competition for the Electrical Manufacturing Industry, approved by President Roosevelt Aug. 4, 1933.

The industry as here represented is in full accord with the Congress and advocates a general manufacturers' sales tax of which it is quite willing to bear its just share in the present emergency. It is believed by this group that, because of its essential equity and because of its capacity for producing large revenue, such a tax is greatly to be preferred to discriminatory taxes levied against certain industries or parts of industries.

The case of this industry with reference to the proposed tax is laid before your committee, not in a spirit of combativeness, but with a desire to place certain facts before you in a spirit of cooperation toward a fair and equitable decision.

The attitude of the industry toward the tax, certain facts in respect to the status of the industry and comments upon the effect of the manufacturers excise tax on this industry are respectfully submitted. It is proposed to show that:

(A) The items designed in the schedule of manufacturers' excise tax revenue bill evidently are selected luxuries, whereas the mechanical household refrigerator is the only utilitarian household appliance designated for taxation.

(B) The manufacture and sale of mechanical household refrigerators is a young industry involved in costly experimentation and development.

(C) The industry has not been generally profitable to investors.

(D) The present and future market for mechanical household refrigerators lies among families of moderate incomes.

(E) The tax has curtailed sales volume.

(F) Mechanical refrigeration, far from being a luxury, is an instrument of health preservation and of thrift.

(G) Reduced volume in the industry has increased unemployment.

(H) The proposed tax adversely affects allied industries, and tends to defeat a declared policy of the administration.

(I) Refrigerator cabinets should not be taxed.

(J) The tax should not exceed that levied against automobiles.

(K) Revenue received as the result of the refrigeration tax has been far less than estimated returns.

The Items Designated in the Tax Schedule Evidently Are Selected Luxuries, Whereas Mechanical Household Refrigerators Are the Only Utilitarian Household Appliance Designated for Taxation

Examination of the proposed tax schedule indicates that, as a general proposition, it was intended to designate certain luxuries. The mechanical household refrigerator, peculiarly enough, is the only strictly utilitarian household appliance included in the entire list. Evidently there was no intent to levy a tax against utilitarian household appliances generally, otherwise the list would necessarily include many items far less necessary for the preservation of health and comfort than mechanical refrigerators.

Inasmuch as there is designated for tax only one of many household appliances, the proposal is highly discriminatory.

Exhibit A

TITLE IV—MANUFACTURERS' EXCISE TAX.

Sec. 601. Excise taxes on certain articles.
Sec. 602 Tax on toilet preparations, etc.
Sec. 603 Tax on furs.
Sec. 604 Tax on jewelry, etc.
Sec. 605 Tax on automobiles, etc.
Sec. 606 Tax on boats.
Sec. 607 Tax on radio receiving sets, etc.

Sec. 608 Tax on mechanical refrigerators.*

Sec. 609 Tax on sporting goods.
Sec. 610 Tax on firearms, shells, and cartridges.
Sec. 611 Tax on cameras.
Sec. 612 Tax on matches.
Sec. 613 Tax on candy.
Sec. 614 Tax on chewing gum.
Sec. 615 Tax on soft drinks.
Sec. 616 Definition of sale.
Sec. 617 Retail sales.
Sec. 618 Sales for less than fair market price.
Sec. 619 Contracts prior to March 1, 1932.
Sec. 620 Return and payment of manufacturers' taxes.
Sec. 621 Applicability of administrative provisions.
Sec. 622 Rules and regulations.
Sec. 623 Effective date.

*The only strictly utilitarian household appliance included in this list.

The Manufacture and Sale of Mechanical Household Refrigerators Is a Young Industry Involved in Costly Experimentation and Development

The number, retail value, and average unit value of mechanical household refrigerators manufactured and sold during the past two decades is indicated by the following tabulation:

Year	Number	Retail Value	Unit Value
1910-1920	10,000	$ 6,000,000	$600
1921	5,000	2,750,000	550
1922	12,000	6,300,000	525
1923	18,000	8,550,000	475
1924	30,000	13,500,000	450
1925	75,000	31,875,000	425
1926	210,000	81,900,000	390
1927	390,000	136,500,000	350
1928	560,000	190,400,000	340
1929	840,000	273,000,000	325
1930	850,000	243,100,000	286
1931	965,000	236,425,000	245
1932	850,000	163,800,000	195
1933	1,050,000	177,277,420	169

These figures are quoted from recognized trade journals (ELECTRIC REFRIGERATION NEWS of Feb. 15, 1933, and *Electrical Merchandising*, January, 1934). According to the same authorities, there were, as of Dec. 31, 1933, 4,900,000 electric refrigerators in use which, as compared with the number of wired homes in the country (19,843,724), indicates a market saturation of 24.6 per cent. From the average unit prices above cited, it is apparent that the industry has struggled to increase volume by constant reduction of retail prices.

It is also apparent that annual volume did not start to increase at a rapid rate until 1925. It will be noted further that while unit volume increased during 1930 and 1931 and was relatively well sustained in 1932, total dollar volume reached a peak in 1929 and has diminished in succeeding years.

Enormous sums of money have been spent by the industry for technical development, sales promotion, and advertising. Many manufacturers, unable to survive the initial struggles that characterize the early years of any new industry, have failed. Others have not yet replaced with profits, the losses and initial expenses in which they have been involved.

We believe that the industry can grow and prosper only if it is not burdened by discriminatory taxes.

(Exhibit B is a photostatic copy of the news story published in the Feb. 15, 1933, issue of ELECTRIC REFRIGERATION NEWS, which news story incorporated the statistics commented on above. Exhibit B1 is a graph of household electric refrigerators sales from 1919 to 1934 and a chart of the average unit price over the same period.)

The Industry Has Not Been Generally Profitable to Investors

While considerable sums of money have been set in motion by the activities of the industry, the courageous investors who have seen fit to finance the industry have profited in far less degree than the army of employes whose wages have been paid by the industry.

Examination of the financial history of the companies here represented would disclose an average record of extremely heavy initial expense and losses with very meager earnings available for dividends. It is believed that if one were to take into account the monies lost in unsuccessful companies, and if one could develop a combined profit and loss statement for all the companies that have engaged in this industry from the beginning of its activities until the present, a very substantial loss would be indicated.

Examination of the profit and loss positions of the several companies engaged in manufacturing and selling mechanical refrigerators during the year 1933 indicates that despite the volume attained in that year, many companies suffered heavy losses. Profits and dividends have been conspicuous by their absence.

The Present and Future Market for Mechanical Household Refrigerators Lies Largely among Families of Moderate Incomes

The statistics first cited indicate that the market, at the end of 1933, was 24.6 per cent saturated. The first buyers of a new device, particularly during the period when the average unit prices are high, are the wealthy families. According to investigations made by the National Bureau of Economic Research, only 13.5 per cent of the personal incomes in the United States exceed $2,000 annually. It is therefore apparent that future buyers of mechanical refrigerators must be people of moderate incomes.

The experience of companies here represented in selling refrigerators to owners of and receivers for apartment houses indicates conclusively that apartments commanding very low rental figures remain vacant if they are not equipped with mechanical refrigeration.

The Starch Report, based upon an analysis of 1,057 families in cities of various sizes ranging from Greenville, Tex., to Philadelphia, Boston, San Francisco, was made to determine what a representative cross-section of the American public "intends to buy next" in connection with types of goods used by the entire family. Twenty-eight per cent of the families interviewed indicated that they next intended to buy electric refrigerators. Incomes among these people fall into the following classifications:

Under $1,000	3.9 per cent
$1,000 to $2,000	26.9 per cent
$2,000 to $3,000	37.0 per cent
$3,000 to $5,000	26.2 per cent
$5,000 to $10,000	5.2 per cent
Over $10,000	.8 per cent

the average income being $2,519.

It is believed that any study that might be made to indicate the incomes of families who will buy mechanical refrigerators during the next several years would indicate conclusively that they will be families of moderate incomes. It is apparent, therefore, that the burden of the tax falls not upon the wealthy few but upon the multitude of American families whose incomes are small.

(Exhibit C is a reproduction of excerpts from the Starch Report referred to, which appeared in *Electrical Home Ware*, April, 1932. Exhibit D is a chart showing the distribution of yearly incomes by amounts.)

The Proposed Tax Has Curtailed Sales Volume

In order that the market might be expanded, manufacturers have struggled to reduce retail prices of refrigerators even though unit profits have been greatly reduced. Inasmuch as the increase in volume of the refrigeration industry has been attained largely by means of constant reductions in retail prices, it follows that any tax which increases the cost to the consumer will curtail volume.

It is not wholly a matter of economics. It is believed that the psychological effect of stigmatizing refrigerators in the minds of the public as luxuries has a serious and far-reaching effect upon sales.

The Federal excise tax upon mechanical refrigerators became effective July 1, 1932. Sales during the six monthly immediately preceding imposition of the tax had declined only 18.45 per cent below sales in the corresponding period of 1931. But, *in the first six months after the tax became effective, sales declined 61.37 per cent*

(Continued on Page 8, Column 1)

We have always made it a policy that our company and not the public, should do the experimenting. Every unit which we offer is time-tested and proved. Naturally Universal Cooler products have a reputation for dependable performance.

UNIVERSAL COOLER CORPORATION
DETROIT, MICHIGAN — BRANTFORD, ONTARIO

MANUFACTURERS OF A COMPLETE LINE OF HOUSEHOLD AND COMMERCIAL REFRIGERATION EQUIPMENT

TAX BRIEF

(*Continued from Page 7, Column 5*)

below sales in the corresponding period in the preceding year.

While the general economic situation admittedly influenced this decline, the tax cannot be disregarded as an important contributing factor.

Mechanical Refrigeration, Far from Being a Luxury, Is an Instrument Of Health Preservation and of Thrift

It is estimated that 70 per cent of the foodstuffs sold in the United States are perishable. Perishable foods become dangerous with the growth of bacteria. The national loss caused by the shrinkage of perishable foods amounts to hundreds of millions of dollars annually. Any mechanism that tends to reduce this tremendous loss must contribute greatly to national welfare.

The most practical means for preventing or minimizing the growth of bacteria in the home is the storage of these foods under constant low temperature. The growth of bacteria at temperatures above 50° F. is extremely rapid. The consumption of food of dangerously high bacterial count frequently results in illness and sometimes in death. Faulty preservation of milk is known to be conducive to high infant mortality.

Dr. Royal S. Copeland, senator from the state of New York, well known as an authority on public health, has said on this subject, "Milk must be kept at a low temperature (50° F. or below) from the time it is produced until it is consumed, if its quality is to be maintained. The only safe way is to have at your disposal some method of artificial refrigeration."

Food preservation has been man's greatest problem from the very first pages of history. In ancient Rome, the legionnaires received part of their pay in salt, because it had been found that salt helped to preserve meats. The ancient Egyptians worshipped their sun-god Ra because his rays dried their foods and helped to preserve them.

Christopher Columbus discovered this continent accidentally while searching for a new route to the East Indies—the source of spices which were needed to disguise the bad flavor in foods of the medieval world. Lord Francis Bacon died of pneumonia contracted while stuffing a fowl with snow to see if cold would preserve it.

Francois Appert discovered canning after Napoleon had offered 12,000 francs to anyone who could find some way of preserving the French army's rations. During the Civil War in this country, an ice-making machine was run through the blockade to help save the starving population of New Orleans.

Throughout history there has been this universal, never-ending struggle to protect the foodstuffs of mankind. Without pure foods, human resistance runs low; with unhealthy, poorly fed people, the progress of the state is threatened.

During the last 20 years this nation has far out-distanced the rest of the world in the care taken with its foodstuffs. Two decades ago, before milk was properly handled and refrigerated, cholera infantum caused a very high death rate among babies. Thousands of them were poisoned during a single summer by the only food their delicate bodies could assimilate.

Among the poor, this disease was particularly prevalent. Even the middle-class families and the rich were powerless to combat this dread sickness.

Many an old-time physician still tells, with tears in his eyes, how he watched life slowly depart from helpless infants. Throughout long nights he has sat beside the tiny crib as the feverish baby cried faintly in the grasp of this weakening disease. He could do nothing; polluted milk, carelessly handled in the home was too great a handicap.

Not alone are children attacked by food poisoning. Adults, too, give way to the ravages of that invisible army which populates the food we eat. These molds and bacteria derive their sustenance from the same types of food we consume. And they cast off a waste, which if swallowed in sufficient quantities, will poison our systems.

As many as 950 per hundred of thousand of population have died from food poisoning in one year, according to the United States Bureau of Census reports. Epidemics, arising from the same source, have struck entire countries from time to time.

Ten thousand cases of sore throat caused by impure milk swept over Chicago. Fifteen hundred cases of typhoid caused by oysters were reported during one season in various parts of the United States. Milk caused 4,755 cases of typhoid in Montreal.

Improperly protected foods have caused, and are still causing, infantile paralysis, undulant fever, summer diarrhea, para-typhoid fever, tapeworm, trichinosis, foot and mouth disease, typhoid fever, dysentery, tuberculosis, septic sore throat, scarlet fever, and diphtheria.

Since 1923, the death rate from food poisoning has been decreasing. The last report shows it reduced to 750 deaths per hundred thousand.

Federal and state inspection of foods, coupled with enforcement of the Pure Food and Drug Act, have helped mightily in this work. Unscrupulous food dealers no longer feel free to endanger the health of their customers by purveying poisonous foods.

The government has spent millions to protect the health of its people. This investment has been wisely made because the strength of the nation depends upon the physical well-being of its people.

Enforced protection of foods, though, stops when these edibles leave the merchant's store. No laws can assure the proper preservation of foods after they reach the home.

If left at room temperature, or in a refrigerator which cannot maintain a temperature continually below 50°, these foods become an incubator for harmful organisms.

The United States Department of Agriculture, Bureau of Home Economics, has warned:

"Milk, fresh meat, poultry and fish, and many fresh fruits and vegetables, should be kept at a temperature of 50° F., or preferrably lower, to check the growth of microbes that cause souring and decay."

The mechanical refrigeration industry has spent tens of millions of dollars in repeating this vital fact over and over again. In effect, this industry has extended the work of the Federal, state, and municipal governments by impressing the vital importance of food protection on the minds of the public.

This industry, with millions spent in education through advertising and other mediums, has helped to increase the effectiveness of the government's insistence upon pure foods.

Fundamentally, the mechanical refrigeration industry, and the government health bureaus are contributing to the achievement of the same results.

In view of this, can mechanical refrigeration fairly be considered a luxury?

Foods are canned to protect them from putrefaction. Canning achieves the same results as mechanical refrigeration. It is merely another means for protecting the health of the public.

Canners use heat to destroy the dangerous microbes in foods. Mechanical refrigerators use cold to halt the growth of these parasites.

"Not alone does a low temperature such as that obtained in a mechanical refrigerator reduce or at least curb the growth of putrefaction bacteria," wrote Dr. W. L. Mallman, famed bacteriologist of Michigan State College. "It also has a marked effect on disease-producing bacteria. The longer foods are kept in a mechanical refrigerator, the fewer disease bacteria do they contain."

So far as known, no luxury tax is contemplated on canned foods. Since canning and mechanical refrigeration both protect the public's health, can one method fairly be called a luxury and taxed, while the other escapes this handicap?

The present plans, we understand, are also to exclude ice cabinets from taxation. Instead of a cooling unit automatically kept cold by a condensing unit, they use ice as a source of refrigeration. But the purpose is just the same. They also are intended for the protection of foods.

If the ice refrigerator is not in the luxury class, is it fair to tax a mechanical refrigerator, which really fulfills the purpose for which it is designed?

The mechanical household refrigerator affords the best means so far discovered of maintaining suitable temperature conditions for the proper preservation of perishable foods. Older means for household refrigeration are relatively faulty because they allow temperatures to rise dangerously high and they are not automatic in their operation.

The mechanical refrigerator is an instrument of thrift because, compared with less modern food preservation mechanisms, the mechanical refrigerator accomplishes the following results:

(1) Economy in cost of operation.
(2) Prevention of food losses.
(3) The householder, having adequate and efficient means for food storage and preservation, need purchase perishable foods only when the lowest prices are offered.

(Exhibit E is a graphic presentation showing growth of bacteria at various temperatures, which graph was issued by the Bureau of Home Economics, U. S. Department of Agriculture. Exhibit F is an excerpt from Farm Bulletin No. 602 indicating the rapid growth of bacteria at temperatures above 50° F.)

Reduced Volume in the Industry Has Increased Unemployment

A canvass of the companies here represented indicated that they gave employment to approximately 180,000 people as of April, 1932. In July, 1932, the first month in which the tax was effective, Nema factory sales were only 20.78 per cent of April sales. With sales reduced by four-fifths, reduction in employment was correspondingly drastic.

Seasonal sales tendencies and the general economic situation contributed

(*Concluded on Page 9, Column 1*)

Startlingly New! Streamline

VENTILATED FRONT
This important feature of all Crosley 1934 models greatly improves the operating efficiency by drawing in cool air from the front and expelling it from the rear, insuring perfect ventilation of the power unit even when the refrigerator is placed in a limited space or close to wall. It makes for better performance and less current consumption.

MODEL EA-35

CROSLEY SHELVADOR

(UNITED STATES PATENT RE-ISSUE NO. 19,008)

CROSLEY Shelvador Electric Refrigerator dressed in STREAMLINE BEAUTY . . . with new, added features is the greatest sensation of the refrigerator world today. Its outstanding success of last year will be surpassed during months to come. More "usable" space . . . greater convenience . . . breath-taking beauty make it a "buy" that appeals to housewives instantly. It reaches out far beyond competition to gather in profits for the Crosley dealers.

The patented and exclusive Crosley Shelvador feature places the Crosley models at the head of the parade. Their ready acceptance has been proved beyond a shadow of a doubt by thousands of users . . . and the experience of some of the largest, oldest and most successful retail outlets.

The stage is set for a repetition in 1934 of the sensational success of the Crosley Shelvador Electric Refrigerator. You now have the opportunity of sharing this success from the very start. See your Crosley distributor . . . this is a real profit-making opportunity.

ALL MODELS HAVE AUTOMATICALLY ILLUMINATED INTERIOR.

only $99.50

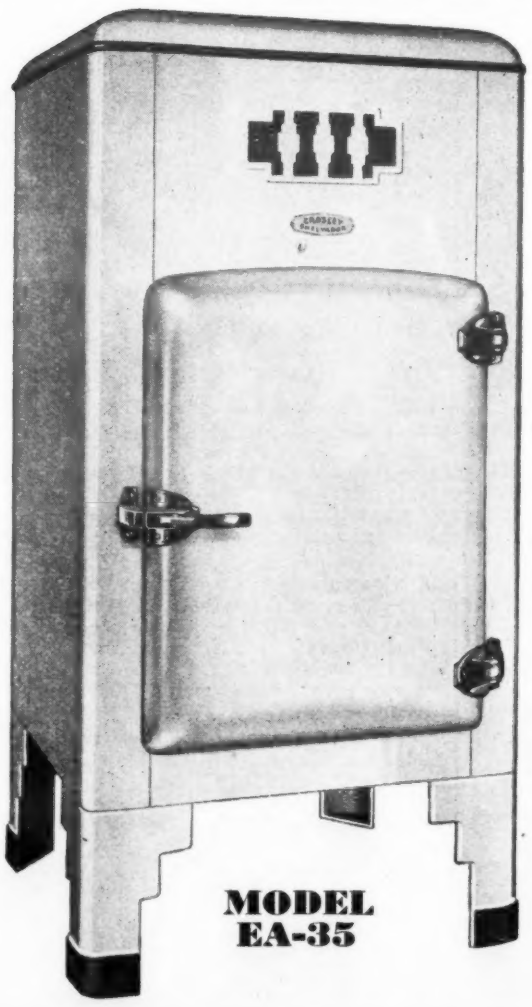
MODEL EA-35

This Crosley Shelvador Electric Refrigerator (shown open above) has a NET capacity of 3.5 cubic ft., with 7½ square ft. of shelf space. Two ice trays, each with 21-cube capacity, or 42 cubes in all. No-stop defrosting control will defrost while operating. Thoroughly insulated body and door. Porcelain interior. White lacquer exterior with black trimmings. Stamped brass hardware is chromium-plated. *Ventilated Front* . . . refrigerator may be placed in a limited space or close to wall. Illuminated interior. Dimensions: 48" high, 23⅞" wide, 24⅞16" deep.

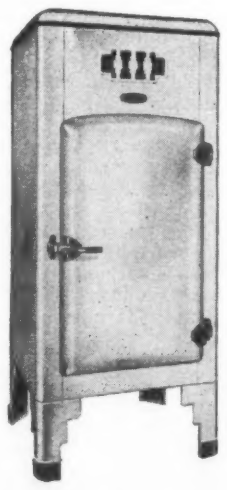
ALL Crosley 1934 models have an extraordinary amount of "usable" space. Use Model EA-45, illustrated above, as an example. While the rated size of this box is 3.5 cubic feet, the "usable" storage capacity is increased about 50% by the Shelvador feature. This box should be large enough for the requirements of the ordinary family. The extraordinarily low price becomes still more amazing to your customer when she learns that the size is comparable to a larger box. Here is an "eye-stopper" from which to "sell up." All Crosley models, in addition to the special features elsewhere described have: self-contained removable unit that may be exchanged without interfering with refrigeration and that has an unequaled record for trouble-free service; ventilated front; thermal cut-out; no-stop defrosting switch that defrosts while operating; one-piece, rounded-corner porcelain interior; flat bar shelves; illuminated interior. ***All models available in full porcelain at slight extra cost.***

Montana, Wyoming, Colorado, New Mexico and west, prices slightly higher.

The Crosley Radio Corporation - Cincinnati
(Pioneer Manufacturers of Radio Receiving Sets)
POWEL CROSLEY, Jr., *President* Home of "*the Nation's Station*"—WLW



MODEL EA-35



MODEL EA-43

Designed for apartment or home. NET capacity 4.3 cubic ft., with 9.15 square ft. of shelf space. Shelvador greatly increases "usable" capacity. Two ice trays, each of 21-cube size; total 42 cubes. Also one double depth tray. No-stop defrosting control; will defrost while operating. Thoroughly insulated throughout. Stamped brass, chromium plated hardware of modern design. Porcelain interior; exterior in white lacquer with black trimmings. Ventilated front. Illuminated interior. Dimensions: 54 11⁄16" high, 23⅞" wide, 24⅞16" deep. Price — delivered, with one year free service. **$117.00**

ALL PRICES INCLUDE DELIVERY..INSTALLATION..ONE YEAR FREE SERVICE

TAX BRIEF

(*Concluded from Page 8, Column 5*)

to this sharp decline in employment, but in the preceding year, reflecting normal seasonal tendencies, July factory sales were 66.18 per cent of April, 1931, sales—a decline of only 33.82 per cent as compared with a decline of 79.22 per cent in 1932. It is therefore apparent that this unfair and discriminatory tax brought about a sudden great increase in unemployment.

It is interesting to speculate as to what part of the total tax revenue received from this industry has been required to relieve distress brought about directly by the imposition of that tax.

(Exhibit I is a bar chart of sales of electric refrigerators before and after imposition of the Federal excise tax.)

The Proposed Tax Has Adversely Affected Allied Industries, and Tends to Defeat a Declared Policy Of the Administration

The mechanical refrigeration industry has, during this period of general depression, contributed a considerable volume of business to other industries which are suffering most seriously from curtailed volume, heavy losses, and unemployment.

According to estimates made in April, 1932, by the publishers of ELECTRIC REFRIGERATION NEWS, the volume contributed by the mechanical household refrigeration industry to a few of these industries is as follows:

Iron and Steel	150,000 tons
Copper and Brass	25,000 tons
Electric Motors and Electric Controls	$15,000,000

To these figures might be added purchases of important volume from the lumber industry, from the insulation industry, from the paint industry, and from many others. In the aggregate, this volume purchased by the refrigeration industry from allied industries, represents the annual employment of many thousands of people and the motivation of large sums of money which must tend, in some measure, to alleviate the distress brought about by unsettled economic conditions. Sharp curtailment of the refrigeration sales in the first year of the tax was reflected in decreased employment by those industries which act as suppliers to refrigerator manufacturers.

Electric current is a commodity purchased by 19,843,724 families in the United States. It is reliably estimated that this represents above 65 per cent of the homes in this country. Any development that tends to reduce the cost of electric current used in the homes of this country must therefore be regarded as a well distributed blessing. The present administration recognizes the force of this statement and has given it expression by the organization of the Tennessee Valley Authority.

Mechanical household refrigerators make it possible for the public utilities to generate and distribute electric current to domestic users at reduced cost. The electric refrigerator adds greatly to the connected household load, and the load characteristics are such as greatly to reduce the cost of generating and distributing household current. It is said that in many wired homes an electric refrigerator virtually doubles the current demand, and in a given community the demand created by electric refrigerators is a constant one throughout the 24-hour period and does not fluctuate seriously throughout the 12 months of the year. A connected load of this type permits public utilities to generate and distribute electric current at lower cost than that which obtains in connection with the lighting load alone.

Any curtailment in the volume of mechanical refrigeration industry will delay a process which ultimately must result in reduced cost for electric current bought by the home owners of America.

Thus the imposition of a discriminatory excise tax on mechanical refrigerators tends to obstruct the accomplishment of a definite objective of the present administration.

(Exhibit H is a photostatic copy of an editorial which appeared in the April 13, 1932, issue of ELECTRIC REFRIGERATION NEWS analyzing the distribution of money brought about by the electric refrigeration industry.)

Refrigeration Cabinets Should Not Be Taxed

No tax is proposed upon ice or ice boxes. This again emphasizes the discriminatory nature of the proposed tax.

There is no essential difference in construction between an ice box and a mechanical refrigerator cabinet—in fact, thousands of ice boxes have been converted into mechanical refrigerators. Under the proposed revenue bill a home owner could purchase an ice box not subject to tax and convert it into a mechanical refrigerator by purchasing the necessary mechanical elements. In this way the tax can be partly evaded. Such evasion will reduce the volume of the mechanical refrigeration industry and bring about a serious element of confusion.

The Tax, If Continued, Should Not Exceed that Levied Against Automobiles

In the entire tax schedule the only other item listed that is not generally regarded as a luxury is the automobile, against which a 3 per cent tax is levied. If a tax must be borne by the mechanical refrigeration industry, there is no apparent reason why it should be higher than the tax imposed on automobiles.

Revenue Received as the Result of The Refrigeration Tax Has Been Far Less than Estimated Returns

It has been shown that the immediate effect of the discriminatory excise tax on mechanical refrigerators was to bring about wide-spread unemployment in the industry and in associated industries. It should be noted that this drastic curtailment of employment took place during the second six months of 1932, which is now generally conceded to be the worst phase of the depression.

Revenue produced by this tax has been disappointing. Surely, such revenue represents an absurd ratio to the damage done by the tax. The estimate of revenue to be obtained from the refrigeration tax was $4,000,000. For the fiscal year ended June 30, 1933, actual revenue from this source was $2,112,000—little more than half of the anticipated return.

Summary

In the proposed revenue bill, mechanical refrigeration is classed as a luxury. It has been shown that the industry cannot reasonably be so classified.

Under the proposed revenue bill, mechanical refrigeration industry is assumed to be a money-making industry. It has been shown that this is not generally true.

The process of developing this new industry must depend upon constantly reduced prices. This process should not be retarded by a discriminatory tax.

It has been shown that this tax is discriminatory in that it is placed upon only one of many utilitarian household devices. It is also discriminatory in that it is levied against one division of the refrigeration industry whereas no tax is levied against competitive divisions of the same industry.

The imposition of a discriminatory tax upon mechanical refrigerators retards the process of making cheap electricity available to our citizens, thereby tending to defeat a declared policy of the present administration.

There is no apparent justification for taxing the mechanical refrigeration industry at a higher rate than that which applies to the automobile.

The people engaged in the mechanical refrigeration industry are fighting to create and develop a new and useful industry. The other industries selected to bear the tax are comparatively old and well-established.

This committee is prepared to submit any additional substantiating evidence that may be required. We shall welcome the opportunity of supplying any addition information concerning our industry that may be helpful to your committee.

Conclusion

In view of the foregoing facts, we respectfully suggest that:

A general manufacturers' sales tax, in which this industry would gladly bear its fair share, be reconsidered.

If the first suggestion cannot be adopted, that mechanical household refrigerators be eliminated from the selective tax schedule.

If neither of the foregoing suggestions can be adopted, that the tax levied against mechanical household refrigerators shall not exceed two and one-quarter per cent.

If a selective tax is levied against mechanical household refrigerators, it shall apply only to the mechanism and not in any case to the cabinet in which the mechanism may be assembled.

G. M. JOHNSTON,
Chairman, Refrigeration Division,
National Electrical Manufacturers Association.

Jan. 19, 1934.

Roosevelt Hopes to Lower All Power Rates

WASHINGTON, D. C.—The ultimate aim of the Roosevelt administration's electric power policy is to provide every home in America with cheap power, generated at public plants on navigable streams, declared Representative Rankin of Mississippi in a speech made last Wednesday before the House of Representatives.

He characterized the power question as second in importance only to the readjustment of the nation's financial structure, and declared enough hydroelectric power was going to waste in the streams to light all the homes, turn all the wheels, and cook all the meals in America.

Rep. Rankin called the attention of the house to the fact that the first TVA power contract, signed with the city of Tupelo, Miss., became effective Feb. 7 to run for 20 years. Under the contract, he stated, consumers will be furnished power for approximately 68% less than rates charged by privately owned utility companies.

...anline Beauty

CROSLEY TRI SHELVADOR

(UNITED STATES PATENT RE-ISSUE NO. 19,008)

Its Sales Message is Packed with Profit!

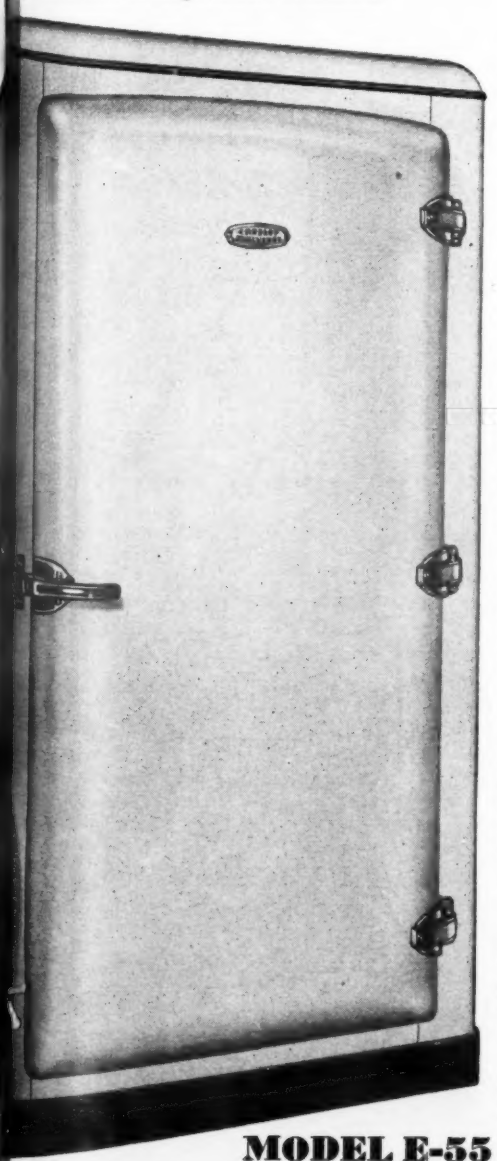
ROSLEY Tri-Shelvador Electric Refrigerator exceeds the fondest dream of those interested in home electric refrigeration. There is nothing like it! Its design is startingly ...its advantages strikingly apparent. Can't help but ...ract customers. Answers every refrigeration need.

addition to STREAMLINE BEAUTY and the extremely ...ular SHELVADOR, it has features which add immeasurably its selling attractiveness and to the convenience of house... The Shelvatray, Shelvabasket, Storabin are patented ...sley features which greatly increase the "usable" space ...d put Tri-Shelvador in a class by itself.

...e sales possibilities of Tri-Shelvador are almost unlimited. ...eans quick, ready sales for Crosley dealers . . . opens the ...y to better refrigeration business.

MODEL E-55
(Shown Open Above)

NET capacity, 5.5 cubic ft. Shelf space, 11.6 square ft. Features Crosley Shelvador; Shelvatray; Shelvabasket; Storabin; self-closing door to ice-tray chamber; no-stop defrosting control, will defrost while operating; three 21-cube ice trays—63 cubes in all; one double-depth tray; thoroughly insulated in door and body; chromium plated hardware of stamped brass; porcelain interior; exterior in white lacquer with black trimmings; illuminated interior. Base rests on floor. Dimensions: 57 1/8" high, 29" wide, 25 13/16" deep. Specially ventilated front. **$157.50**



MODEL E-55

1 THE SHELVADOR . . . the biggest sales feature in refrigeration. Increases "usable" space about 50% over rated capacity. Think of the price advantage to the Crosley dealer who can sell on a comparative basis of "usable" space. Think of the convenience to the housewife, whose "reach-and-hunt" days are over.

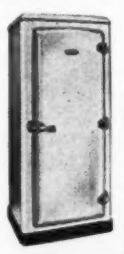
2 THE SHELVA-TRAY . . . when you want what is behind the chicken, merely put Shelvatray in a level position, put the chicken on it and get what you're after. Shelvatray (patent pending) an exclusive Crosley feature, saves steps and "stoops." Just put what you want on Shelvatray and take it all—Shelvatray and all—to table or stove.

3 THE SHELVA-BASKET..handy for greens, cabbages, carrots and the like. Swings with door. A place for everything and everything in place. Exclusive, of course. (Patent pending.)

4 THE VENTILATED FRONT . . . increases efficiency and economy of power unit. Stops "churning" of warm air when refrigerator is placed close to wall or in limited space. Exclusive. (Patent pending).

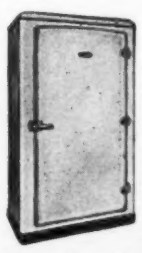
5 THE STORABIN... A place for potatoes and onions and other bulk items. Just another example of Crosley's scientific use of space ordinarily wasted. Not refrigerated. Exclusive. (Patent pending.)

The above are only SOME of the features. Get in touch with your Crosley distributor. See the new Crosley models.



MODEL E-43

NET capacity, 4.3 cubic ft. Shelf space, 9.15 square ft. Incorporates all features of Model E-55. Two ice trays, each holding 21 cubes—42 cubes in all—also one double-depth tray. Chromium plated brass hardware, porcelain interior, white lacquer black trimmed exterior. Base rests on floor. Interior illuminated. Dimensions: 56 11/16" high, 23 7/8" wide, 24 7/8" deep. Price, delivered, installed, one year free service.... **$135.00**



MODEL E-70

NET capacity, 7 cubic ft. Shelf space, 14.9 square ft. Incorporates all features of Model E-55. Has four 21-cube ice trays—84 cubes in all, and one double-depth tray. Hardware is stamped brass. chromium plated. Porcelain interior with white lacquer exterior trimmed in black. Base rests on floor. Dimensions: 58 3/8" high, 32 3/4" wide, 26 3/8" deep. Specially ventilated front. Price, delivered, installed, one year free service..... **$185.00**

Montana, Wyoming, Colorado, New Mexico and west, prices slightly higher.

The Crosley Radio Corporation - - Cincinnati
(Pioneer Manufacturers of Radio Receiving Sets)
POWEL CROSLEY, Jr., *President* Home of "*the Nation's Station*"—WLW

ALL PRICES INCLUDE DELIVERY..INSTALLATION..ONE YEAR FREE SERVICE

AIR CONDITIONING

New Air-Conditioning Systems Shown To Ventilating Engineers

(*Continued from Page 1, Column 2*)

gested city tap water for their "air-conditioning" equipment are now showing refrigerating machines as an actual component part of their systems.

Air-conditioning systems for comfort cooling were shown by the following manufacturers: Air Conditioning Industries, Inc., New York City; Baker Ice Machine Co., Omaha; Bryant Heater Co., Cleveland; Campbell Metal Window Corp., New York City; Carrier Engineering Corp., Newark; Crane Co., Chicago; Fox Furnace Co., Elyria, Ohio; Frick Co., Waynesboro, Pa.; Frigidaire Corp., Dayton; General Electric Co., Air Conditioning Dept., New York City; Modine Mfg. Co., Racine, Wis.; L. J. Mueller Furnace Co., Milwaukee; Niagara Blower Co., New York City; Strang Air Conditioning Corp., Kansas City; Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; L. J. Wing Mfg. Co., New York City; Wood Hydraulic Hoist & Body Co., Detroit; York Ice Machinery Corp., York, Pa., and Young Radiator Co., Racine, Wis.

Air Conditioning Industries, Inc., headed by W. D. Jordan, president, demonstrated the Zephyr Washed Air units employing a refrigerated water spray in a vertical cabinet for cooling, cleaning, dehumidifying or humidifying air for homes and offices. This is the same organization which formerly operated in Chicago as Air Control Systems, Inc.

Baker Ice Machine Co. showed its air and water-cooled methyl chloride commercial refrigeration systems, as well as its ammonia machines and a suspended type room cooler.

Bryant Heater Co. made first public showing of a Silica Gel summer air-conditioning floor-type cabinet developed in conjunction with the American Gas Association.

The Bryant system employs a bed of Silica Gel through which air is drawn, the Silica Gel absorbing a considerable quantity of moisture. This dehumidified air is mixed with humid air from the room in the circulating fan, and forced through a city tap water cooling coil where the air *temperature* is reduced for discharge into the room as conditioned air.

About once a day, if the condition is used continuously, the Silica Gel beds must be dried out by application of heat from the gas-burning heater under them. During this "reactivation" process, the hot moist air from the Silica Gel is dispelled outdoors through a window opening or flue. The reactivating cycle continues automatically while the control lever is at "reactivation."

The Bryant unit can be placed beneath a window, in the room being conditioned, or it can be installed in the basement under the room it serves.

American Radiator Exhibit

Being a subsidiary of the American Radiator & Standard Sanitary Corp., the Campbell Metal Window Corp.'s display was part of the extensive American Radiator exhibit of Kewanee boilers, Fox furnaces, Detroit Lubricator valves and controls, Arco copper fittings, pipe, cast-iron sections, etc.

The Campbell exhibit included its room cooler with the street noise eliminating feature, the Campbell humidifier, and the Campbell year 'round air conditioner.

Carrier engineering's booth was principally a resting place, with several large cushioned chairs for footsore visitors to use. Various executives of the Carrier company were on hand during the exposition to discuss air conditioning.

Crane Co. showed a new "Crane-Sturtevant" residential air conditioner of the central warm air heating type, with a finned surface cooling coil through which refrigerated or city tap water can be passed to cool air. Cleaning and humidification are accomplished by filters and a battery of small spray heads.

Fox Shows Domestic Unit

In the Fox Furnace exhibit was one of the company's domestic air-conditioning plants for all-season operation, circulating warm, humidified air in winter and refrigerated, dehumidified air in summer. Connected up to the Fox furnace was a 3-hp. General Electric water-cooled condensing unit.

Frick Co. introduced a new Freon compressor at the show. Designed particularly for air conditioning, the new Frick compressor has two cylinders, bore and stroke of which are 5¾ by 4 in. Its capacity with air-conditioning pressures is 15 tons of refrigeration per day.

The compressor is driven by seven V belts, with a maximum speed of 500 r.p.m. Construction is of the enclosed ammonia compressor type, with truncated pistons so that suction gas doesn't get into the crank-case but enters the cylinder above a lower set of piston rings. An ample oil separator in the suction line returns oil to the crank-case.

Frigidaire's Complete Line

Frigidaire's spacious exhibit included the complete line of air-conditioning equipment manufactured by that company—suspended room coolers, floor-type air-conditioning cabinets, the various air-cooling coils up to the large store cooling unit, and two Freon condensing units (3 and 10-ton).

Just introduced by exhibit in General Electric's display was the new G-E *gas-fired* furnace, supplementing the G-E oil-burning furnace sold this past year. Details of the new gas-fired furnace are published in the announcement on page 13 of this issue of ELECTRIC REFRIGERATION NEWS.

General Electric also showed its year around air conditioner, its floor and suspended types of room coolers, its residential humidifier, and a G-E Freon refrigerating machine.

In the booth of the Modine Mfg. Co. were unit heaters and unit coolers produced by that firm.

Mueller's Central Conditioner

Mueller Furnace demonstrated its central air conditioner for all-season use, employing a six-ton Frigidaire condensing unit for refrigeration.

Niagara Blower Co. displayed an extensive line of air-conditioning equipment for industrial and special process work. This included brine and water spray coolers, disc fan heaters and coolers, fan assemblies, and various aluminum coil sections.

Strang Air Conditioning Corp. showed new models of the Strang room cooler which employs a novel method of disposing of the heat removed by the refrigerating machine. The compressor is water cooled from a supply of water in an "evaporation" tank. Water in this tank is kept cool by a fan and spray arrangement which discharges warm humid air outdoors through a window outlet. Water must be added to the tank occasionally to make up for evaporation.

Strang's Condenser Cooler

The Strang company has also developed a condenser cooler, designed to replace the condenser on water-cooled refrigerating plants up to four tons of refrigeration per day.

The condenser cooler is an assembly of a water tank, finned coil, motor-driven blower, an agitator, and a duct connection to carry off the humid air. Refrigerant is condensed in the finned coil which is submerged in water; this water is kept cool by the agitator which creates a fine spray in the path of the blast of air from the blower. Make-up water is added automatically by a float control valve.

Westinghouse Electric & Mfg. Co. showed its year 'round cabinet air-conditioning units for floor mounting, its self-contained room cooler, suspended type room cooler, Westinghouse Freon refrigerating machines up to six tons, and a new four-ton overhead cooling unit for air conditioning.

One corner of the Westinghouse exhibit was a booth segregated from the conventional hall to demonstrate operation of the refrigerating machine and room cooler. Here also was a dissembled self-contained room cooler, showing its constructional details.

L. J. Wing Mfg. Co. demonstrated its "Utility Cooler," a large unit cooler for industrial and large room cooling applications. Also shown were Wing unit heaters of various sizes.

Wood Hydraulic Hoist and Body Co. showed the Gar Wood warm air furnaces to which refrigeration may be applied to give an installation year 'round functions. This exhibit was in charge of the E. B. Latham Co., New York distributor.

Two New York Products

Two new products made their appearance in the exhibit of the York Ice Machinery Corp. One was a small black floor-mounted room cooler of modernistic design, operating in connection with a ¾-hp. York Freon compressor.

Another new York product was an overhead air cooling unit with capacity of six or seven tons of refrigeration per day. The company also displayed ceiling type room coolers, floor-type year 'round air conditioning cabinets, its self-contained year 'round central air conditioner for basement installation, Freon condensing units, and a new attractively finished sound-reducing casing, to place over condensing units installed in offices, etc., where noise is objectionable.

Young Radiator Co. featured unit coolers, unit heaters, and young "Convectors" for heating from built-in spaces. The unit coolers are built with two types of radiator cores, one for use with refrigerated water or brine, the other for direct expansion of refrigerant. The company showed also cut-away sections of its heat transfer construction for refrigeration condensers and evaporators.

Telling the Story of Summer Comfort

Don Frank, in charge of Frigidaire's exhibit at the heating and ventilating show, tells a visitor how a suspended type room cooler works.

Accessories and Controls At the Exposition

A wealth of new accessory and control equipment for heating and cooling apparatus was displayed at the exposition, as well as many of the component parts of air-conditioning installations—fans and blowers, grilles, motors, filters, boilers, humidifiers, finned surface coils, etc.

Considerable progress was evident in the development of new and more sensitive control devices, including several new thermostats, new solenoid valves, humidistats, and a number of instruments for more accurate regulation of air-conditioning apparatus according to pre-determined conditions of air temperature and humidity.

Effective Temperature Control

Julien P. Friez & Sons, Inc., of Baltimore displayed its new "Comfortrol" instrument for controlling air-conditioning equipment according to the A.S.H.V.E. chart of effective temperature. This control embodies a Friez humidistat and a thermostat, each with a dial regulator which can be set to hold an air-conditioning system to any desired range in the comfort chart.

This company also showed high and low voltage humidistats, thermostats, relays, transformers, temperature and relative humidity indicators, and a portable 24-hour recording instrument for records of humidity, temperature, and combination of humidity and temperature.

'Modutrol' Control

Minneapolis-Honeywell Regulator Co. demonstrated its "Modutrol" effective temperature control with working models mounted in its exhibit. The application and operation of this control was described in the Oct. 11, 1933, issue of the ELECTRIC REFRIGERATION NEWS. The Minneapolis-Honeywell exhibit also featured the "Thermochron" control for heating systems, and show-

(*Concluded on Page 11, Column 1*)

Nationwide Coverage

with branch sales offices, motor warehouses, and service stations

Assures Quick Service

when a replacal motor or a motor-part is urgently needed

Above — Location of Wagner's 26 branch offices and service stations.

At Left—Airplane view of the Wagner plant, located at St. Louis, in the center of the U.S.A.

You realize the importance of quick service when a replacal motor or a repair part is needed. So does Wagner—hence, 26 branch offices, warehouses and service stations in all parts of the country. Each service station has a complete stock of motor-parts, available for immediate shipment.

Your customers expect uninterrupted refrigeration, and immediate repairs or replacals when trouble develops. Wagner's nationwide coverage is your assurance that your customers need not be disappointed.

When there's trouble with any make of motor, or any information wanted on motors, get in touch with Wagner's nearest branch.

Wagner Electric Corporation
6400 Plymouth Avenue, Saint Louis, U.S.A.

MOTORS TRANSFORMERS FANS BRAKES

S533-1

NOTICE
ANNOUNCEMENT
Feb. 21st!

Accessories for Air-Conditioning Installations Are Displayed

(Concluded from Page 10, Column 5)

ed its various controls for commercial refrigeration systems.

Penn Electric Switch Co. showed its complete line of heating and refrigeration controls, water-regulating valves, etc. and introduced in addition a brand new product — a condenser cooler. This is a forced-draft "cooling tower" outfit built in a 24x40x20-in. cabinet for condensing refrigerant in commercial refrigeration systems up to five tons of refrigeration capacity.

Chief advantage cited for apparatus of this type is that it conserves most of the water ordinarily passed through the conventional water-cooled condenser. Penn engineers also point out that it can be used as a room heating and humidifying unit.

The condenser cooler consists of two groups of discs which rotate slowly through a tank of water, and a centrifugal fan which forces a continual draft of air across surfaces of the discs to cool the water. Further details will appear in an early issue of the NEWS.

Penn Representatives

Albert Penn, president; M. E. Henning, vice president; and Nelson Delavan, sales manager of the company, were present from the Penn Switch factory, while R. V. Clark represented the local New York office.

Another complete display of controls for heating and refrigeration systems was that of Detroit Lubricator Co., subsidiary of the American Radiator & Standard Sanitary Corp. with a prominent space in the American Radiator exhibit.

Attending the exposition from this company were C. J. Swan, sales manager; P. S. Russell, manager of the oil burner division; A. G. Hahn, field engineer; R. L. Campbell, special engineed; and Dick Townsend, eastern representative of the Detroit Lubricator Co.

New Controls

Automatic Products Co. of Milwaukee showed a number of controls for air conditioning, including solenoid valves for water and for low-pressure refrigerants, humidity regulators, relays, and room thermostats.

Mercoid Corp. of Chicago was another exhibitor, with its mercury switches and controls.

Temperature and pressure recording and indicating instruments were shown by the Bristol Co., and a new device known as the "Metameter" for measurement of pressure, temperatures, etc. and transmission of them to a central point as far distant as 250 miles.

Taylor Thermometers

Thermometers and various recording instruments for the air-conditioning industries were shown by Taylor Instrument Co. of Rochester, N. Y. One of the features this company is incorporating in its controls is a "low sensitivity" adjustment which prevents deviation from a control point when load changes occur.

Solenoid valves and various heating controls and specialties were displayed by the Barber-Coleman Co. of Rockford, Ill.

The Tork Clock Co. showed how its electric clocks can be applied to start and stop air-conditioning installations.

Temperature controls for heating or refrigerated air-conditioning equipment were displayed by Sarco Co., Inc.

Motors and Fans

That the motor manufacturers are conscious of the special requirements of air conditioning was apparent from the various exhibits of motors at the exposition. These had special rubber or resilient mountings for quietness and various other refinements to reduce noise and vibration for air-conditioning equipment.

Motor manufacturers exhibiting included: Allis-Chalmers Mfg. Co., Milwaukee; Century Electric Co., St. Louis; Emerson Electric Mfg. Co., St. Louis; General Electric Co., Industrial Department, Schenectady, N. Y.; Holtzer-Cabot Electric Co., Boston; and Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Manufacturers of fans and blowers, specially developed for the new methods of air conditioning, were also showing equipment of greater quietness and improved adaptability to both large and small air-conditioning apparatus. Devoted entirely to blowers were exhibits of Air Controls, Inc., division of Cleveland Heater Co., Cleveland; and Lau Heating Service, Inc., Dayton.

Grilles and Outlets

Exhibits of grilles and air distribution outlets were another interesting classification. Manufacturers in this group included Independent Register & Mfg. Co., Cleveland; Tuttle & Bailey, Inc., New Britain, Conn. (consolidation of Tuttle & Bailey Mfg. Co., Hart & Cooley, and Wm. Highton & Sons); Uni-Flo Grille Corp., Detroit; Waterloo Register Co., Waterloo, Iowa; and the Wickwire Spencer Steel Co., New York City.

Features of the new grilles are positive volume control and more attractive appearance. Uni-Flo showed quite an extensive display of its grilles with directed air flow also.

New Coppus Filter

Filters were demonstrated by Coppus Engineering Corp., Worcester, Mass., and the Owens-Illinois Glass Co., Toledo.

The Coppus exhibit featured a new automatic, self-cleaning air filter which employs a special wool felt for a filter curtain, arranged as an endless belt running in zigzag fashion over rolls. Bottom rolls of this filter are connected by chains and sprockets to a small geared electric motor which is started either by a time clock at predetermined intervals, or by a sensitive pressure gauge whenever a maximum air resistance is developed.

Operating simultaneously with the motor of the filter drive is a vacuum cleaner whose suction cleans the filter in the course of its 15- or 20-minute revolution.

'Dustop' Air Filter

Owens-Illinois demonstrated the "Dustop" replacement type air filters with a set-up of a large Clarage centrifugal fan drawing air from the exposition hall through the filters.

This company also showed its glass brick, with a section of wall built of them. These bricks are hollow, twice the size of ordinary clay bricks, and are made of the same glass used in milk bottles—which is claimed to be the toughest glass known. The bricks are built into a wall just as with clay bricks, using ordinary mortar.

York Develops Five Air Conditioners

(Concluded from Page 1, Column 2)

similar applications where summer cooling and winter heating are required.

Air conditioners of the ceiling type are in two new models, in a standard tan baked crinkled finish for use where floor space is limited. The C-60-D4 ceiling type unit is a compact heating and cooling unit. The C-600 is of similar type but of larger capacity.

Finally, the basement type air conditioner is of the self-contained air-conditioning system type having all the elements of a central system air conditioner within one casing. It can be used for air conditioning space direct, or can be hooked up with a duct system to air condition any other parts of a building.

The casing on the basement type unit air conditioner is of special composition material which encloses the entire unit. It is finished in black crinkled enamel, baked on and trimmed with a satin finish stainless steel on the corners.

COMMERCIAL CABINETS

by

Seeger

SAINT PAUL

Any dealer or distributor of electrical refrigeration will find that the selling of Commercial Cabinets by Seeger will greatly increase the morale of his organization. It's much easier for the sales department to increase sales when they can have the most implicit confidence that the merchandise they are selling gives the utmost in value. The large number of Commercial Cabinets by Seeger in use daily after years of hard usage is the best evidence that implicit confidence is merited.

Seeger Commercial Cabinets are to be had in many models—in porcelain or lacquer finish, in stock models or made to order, each one built on experience to give the best service at low operating expense.

Commercial Cabinets by Seeger are sold profitably through Dealers and Distributors of Electrical Refrigeration as they sell as easily as they are serviceable.

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SAINT PAUL, MINNESOTA

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AIR CONDITIONING

Speakers Report Air-Conditioning Tests In Schenectady and Milwaukee Homes

(*Continued from Page 1, Column 1*)
President W. T. Jones, and two technical papers, "Automatic Controls for Forced Air Heating Systems" by S. Konzo and A. F. Hubbard, and "Heating Buildings with Hot Water" by B. F. Burt and S. R. Lewis. Reports of the secretary and various committees concluded the afternoon.

Past presidents of the society joined for dinner that night at the Transportation club, followed by the president's reception and informal dance in the Casino Bleu where Paul Whiteman's orchestra plays.

Technical Papers

Tuesday morning's session included technical papers on "Design and Equipment of the Pierce Laboratory" by C. A. Winslow, Leonard Greenburg, L. P. Herrington, and H. G. Ullman; "Selecting Temperatures and Wind Velocities for Calculating Heat Losses" by P. D. Close; "Radiation of Energy Through Glass" by J. L. Blackshaw and F. C. Houghten; and "Studies of Solar Radiation Through Bare and Shaded Windows" by Mr. Houghten, Carl Gutberlet, and Mr. Blackshaw.

Air conditioning was the key subject for Tuesday afternoon's meeting, with four reports of research conducted last summer. First, however, Walter Fleisher, chairman of the A.S.H.V.E. *Guide* publication committee, presented his report of the 1934 *Guide* which is just coming off the press.

The new book, he said, has 42 chapters and 618 pages, and 7,500 copies are being printed. Chapters on air conditioning have been extended, revised, and rewritten, he said.

Elliott Harrington, the first speaker, described General Electric's "Proving Home for Air Conditioning Investigations" in Schenectady, N. Y. This 10-room, three-story cottage is the home in which Mr. Harrington and his family reside.

Thus far more than 30 tests have been made or are in process at this home. Findings resulting from four of these were incorporated into the paper read by Mr. Harrington. The tests cover some months of operation, and show comparative results and in some cases comparative costs between steam heat and complete air conditioning.

Among other results, it was found that under complete winter air conditioning there has been a substantial reduction of dust accumulation in the living quarters. So marked is this that the maid is only obliged to dust the rooms every third day instead of every day, as was necessary with heating by steam radiation.

The humidity factor was under close control, as was the temperature, resulting in improved comfort. The temperature all over the house was kept uniform and tobacco smoke odors were altogether eliminated.

The temperature differential between floor and ceiling was reduced in the living room from maximum of 8¼ and minimum of 5¼ with steam to maximum of 3½ and minimum of 1¾ with air conditioning. With the outside temperature some 30° lower the maximum differential under air conditioning was 6 and minimum was 3¼.

Mr. Harrington announced that an intensive schedule of investigation work, covering a period of at least two years, is under way. The residence, unofficially established as the air conditioning proving home of the company in September, 1928, received official recognition as part of the General Electric Air Conditioning Institute on March 1, 1933.

Low Cost Conditioning

"Low Cost Air Conditioning for a Small Residence," subject of the next paper, by M. K. Drewry of the Milwaukee Electric Railway & Light Co., described a tap-water cooling system for a Milwaukee cottage.

In that city tap water is available at a temperature of from 50 to 60° F. all summer, the speaker said. Another helpful condition is the fact that on Milwaukee's hottest days the tap water reaches its lowest temperatures of the summer season.

"Summer operation for cooling consists of admitting tap water to a finned coil in the warm air circulating duct, and operating the fan continuously to supply cooled air to each room through riser pipes and the same registers as are used for heating," he said.

This arrangement produced a daily average effective temperature of 75.5° which is only .5° above the upper limit of the summer comfort zone, and the annual summer cooling cost is only about $6, the speaker declared.

"Early-morning room temperatures of 78° F. rose to 81° F. by evening when water flow was not allowed to exceed 1,000 lbs. per hour (0.9¢ per hour). Later experience proved that greater water flow improved the radiator performance more than expected, and 79° F. room temperature was later maintained positively constant on a bright 95° F. (maximum) day with 60° F. inlet water.

"Dehumidification did not afford the 50% relative humidity median suggested by comfort chart in the *Guide* for 70% was averaged. On one 36-hour run, 2 lbs. per hour of condensation was collected, and inside air averaged three-fourths the water-vapor content of outside air.

"All registers were used for cooling without change. Return air averaged 2° F. lower than air at the breathing level, and 3½° F. difference existed from floor to ceiling. Register velocity of 400 ft. per minute caused the cooled air to ascend to the breathing level at about 45° angle, after which it descended.

"Discarding of cooling water onto the residence lawn proved a practical and desirable procedure. Irrigation requirements were not exceeded during the 312 hours of cooling found necessary. The table summarizes cooling data for the summer."

Two two following papers dealt with attic ventilating fans in summer cooling at night, and are reported in detail elsewhere in this issue.

Wednesday morning's session was first presented with a paper "Thermodynamic Properties of Moist Air" by John A. Goff, followed by a "Study of Air Conditioning and Office Employes Efficiency" by Dr. W. J. McConnell and I. B. Kagey.

In this paper Dr. McConnell described the complete air-conditioning system which went into operation last May in the 28-story Metropolitan Life Insurance Bldg., New York City.

The system was operated 11 hours per day, except on hottest days when it was started two hours before the office opened instead of just one hour before, making 12 hours per day.

In designing the installation, Dr. McConnell said, considerable care was taken to avoid giving the occupants a feeling of chilliness.

Workers in the air-conditioned offices feel much less fatigued, the speaker claimed, and absenteeism has decreased. Complete records are now being kept to determine more accurately the effect of air conditioning on absenteeism.

The installation embodies four 325-ton refrigeration machines in the basement which cool water which is pumped up to the fifteenth floor. Here the air is conditioned and distributed upward and downward by ducts to the other stories. Heating is by direct radiation.

Relief from Hay Fever

That those suffering from hay fever can obtain relief while in air-conditioned rooms was disclosed by T. A. Kendall and Dr. Garland Weidner of the University of Kentucky in a paper presented by W. H. Driscoll, past president of the society, before the Wednesday morning session.

During the hay fever season of 1932 and 1933 the air-conditioned Dicker Hall on the University of Kentucky campus was made available to the public as a possible haven for hay fever sufferers.

During the 1933 season approximately 100 hay fever cases visited the air-conditioned hall. Among these were 40 cases selected for study, the others being excluded because their cases were complicated with other disease or the records were incomplete. All of the 40 visitors selected for study received some degree of relief in the air-conditioned room. Satisfactory relief was obtained upon 90% of all visits made by these patients, according to the authors.

Those whose hay fever symptoms were sneezing and irritation of the mucous membrane received the greatest amount of relief. Those suffering with irritated eyes and face and running nose obtained a moderate amount of relief while stopped up nose, headache, and general depression were relieved but slightly.

Even small amounts of pollen in the atmosphere appear to interfere with the relief effected by an air-conditioned atmosphere for whenever the pollen count in the hall increased there was a consistent increase in the number of unrelieved cases. Patients who left the air-conditioned hall in the evening experienced relief for a longer time than those who left during the day.

Some cases seeking relief from hay fever were actually made worse by the air-conditioned atmosphere which caused the authors to warn that air conditioning should not be offered indiscriminately to all types of patients suffering with what appears to be hay fever or asthma.

"Corrosion Studies in Steam Heating Systems" by R. R. Seeber, F. A. Rohrman, and G. E. Smedberg was the concluding paper of the morning.

The afternoon session heard papers on "Carbon Monoxide Surveys of Two Garages" by A. H. Sluss, E. K. Campbell, and L. M. Farber, "Diurnal and Seasonal Variations in the Small-Ion Content of Outdoor and Indoor Air" by C. P. Yaglou, "Air Conditioning in its Relation to Human Welfare" by Dr. C. A. Mills, and "Engineering in the Hospital of Tomorrow" by C. F. Neergard.

Physiological Effects of Varying Climates

Dr. Mills showed that people living in the temperate climate which prevails in this country have more colds, appendicitis, suicides, pneumonia, and certain chronic ailments than inhabitants of colder or warmer zones where the temperature and barometric pressure are more uniform.

He ascribed this rapid changes in weather due to storms and our seasonal weather variations which keep us keyed up with nervous energy so that we have a tendency to work too hard and keep down our resistance to illness.

To prove these points he showed maps charting the intensity of this "climatic drive" and charts indicating the prevalence of diabetes, pernicious anemia, cancer, and nephritis where the "climatic drive" is strongest.

He predicted that the time is coming when air conditioning will be used to avoid excessive climatic stimulation in the temperate zone, and to raise the energy level of Southern people.

Annual banquet and dance of the

(*Concluded on Page 13, Column 2*)

Her Eyes on the Presidency

Willis Carrier (right), pioneer air-conditioning engineer and past president of the A.S.H.V.E., congratulates C. V. Haynes of Philadelphia, incoming president, with Miss Henrietta Betlam, member from Rochester.

* * *

Girl Engineer, 22, Studies Air Conditioning

NEW YORK CITY—An apt student of air conditioning and a first-rate heating engineer, 22-year-old Miss Henrietta Betlam (who is pictured above with Willis Carrier and C. V. Haynes) was one of the most diligent attendants at technical sessions of last week's A.S.H.V.E. convention. Generally she was the only lady engineer at the meetings.

Making layouts, drawings, and preparing specifications for a warm-air heating system is no trick for Miss Betlam, for that's the business she and her four brothers follow in Rochester, N. Y., as the Betlam Heating Co., distributor of Carrier air-conditioning equipment.

But complete year 'round air conditioning involves some problems that the Betlam brothers want the latest information on, so they delegated the youngest member of the firm to come down to the A.S.H.V.E. sessions.

She has been active in the business since graduation from high school five years ago, and is now planning to enter Rochester University to study engineering.

She's been too interested in business to start college before, and even now plans to divide her time between work and school.

Born in Holland, her fair complexion, blond hair, and blue eyes show her Dutch ancestry. Her two main hobbies are her cabin cruiser and dramatics.

SUMMER COOLING DATA AND COSTS IN MILWAUKEE

	June	July	August	September	All
Hours of cooling	186	88	16	22	312
Cooling water, cu. ft.	2,793	1,671	340	495	5,299
Cooling water, lbs. per hour	940	1,190	1,330	1,390	1,060
Cooling cost, $	1.68	1.00	0.20	0.30	3.18*
Cooling cost, ¢ per hour	1	1.1	1.25	1.35	1.02
Electricity, 26 kwh. at 3¢	...	...	...	...	$0.78
Total cooling cost for summer	...	...	...	...	$3.96
Total cost per hour	...	...	...	...	$0.0127
Estimated total cost for normal summer	...	...	...	...	$6.00

*$5.84 was total billed for period of May 12 to Sept. 26, 8,900 cu. ft. at 6¢ per 100 cu. ft. plus 50¢ service charge. 4,900 cu. ft. was used the previous summer.

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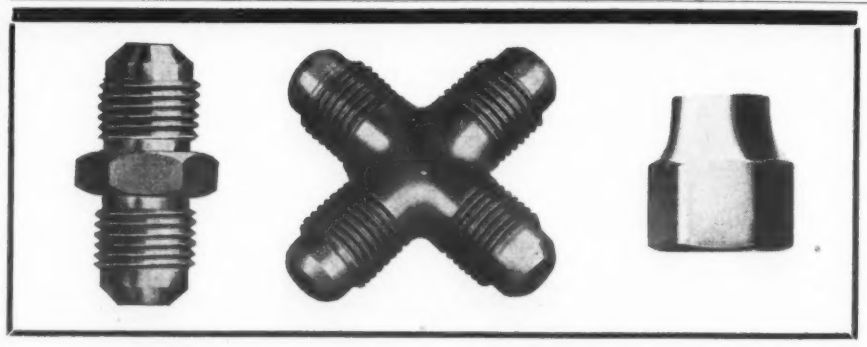

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Commonwealth carries in stock almost every conceivable size of pipe and tube fitting and in addition can make prompt shipment of many combinations not usually found.

It is a good rule to depend on Commonwealth as a complete source of supply for fittings.

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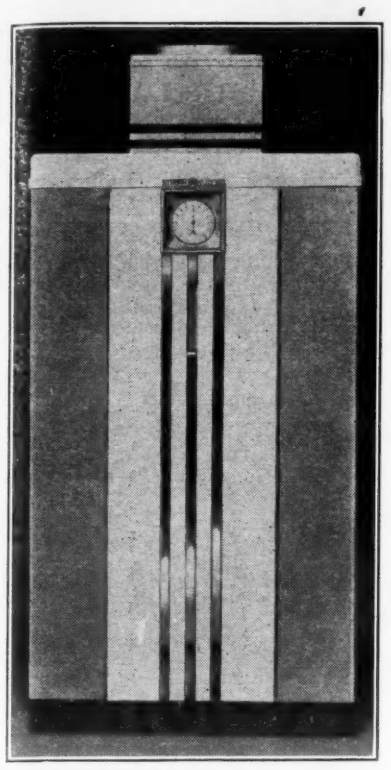


New G-E gas-burning furnace

* * *

G-E Exhibits Line fo Gas Furnaces

NEW YORK CITY—General Electric Co. announced a new line of gas-burning furnaces last week to supplement its oil furnace placed on the market a year ago. The gas furnace will be a coordinated unit with burner, boiler, control, and all parts enclosed in a single jacket of distinctive appearance, and G-E air-conditioning dealers throughout the country will be ready to make installations early in March.

In addition to the dealers now handling G-E oil furnaces and air-conditioning equipment, new dealers are now being appointed in territories not covered, and where natural gas is easily available.

To provide a central location for shipping and to be near the natural gas territory, the new furnaces will be manufactured in Cleveland. A factory has already been equipped and production is under way. The first showing of the new furnace took place at the Heating and Ventilating exposition last week.

In announcing the new gas furnace, J. J. Donovan, manager of General Electric's air-conditioning department, said:

"Various sizes of gas furnaces will be available for residential, commercial, and small industrial applications, and also for large quantities of hot water. The G-E gas furnace will also be interchangeable with the G-E oil furnace as part of the G-E air-conditioning system.

A.S.H.V.E. Talks About NRA Codes

(*Concluded from Page 12, Column 5*)

society was held that night in the Cascade ballroom of the Biltmore, with Meyer Davis' orchestra. Banquet speakers were W. T. Jones, president of the society; Thorton Lewis of Carrier Engineering Corp.; E. D. H. James of the National Broadcasting Co.; and President-elect C. V. Haynes.

The next morning's session heard two technical papers: Study of Fuel Burning Rates and Power Requirements of Oil Burners in Relation to Excess Air" by L. E. Seeley and E. J. Tavanlar, and "Design and Valuation of Cast Iron Domestic Heating Boilers" by C. W. Brabee.

At the installation proceedings which followed, C. V. Haynes of the Hoffman Specialty Co., Philadelphia, took office as president of the society, succeeding W. T. Jones of Boston, retiring president. John Howatt of Chicago was elected first vice president, and G. L. Larson of Madison, Wis., second vice president. D. S. Boyden of Boston and C. V. Hutchinson of New York were re-elected treasurer and secretary respectively.

Last session of the convention was held Friday morning, with a talk by Beverly S. King, assistant deputy administrator, followed by an open discussion of NRA codes.

At the conclusion of the meeting a committee was appointed to consider the feasibility and desirability of preparing a master code under which all manufacturers of heating, ventilating, and air-conditioning equipment could function.

G. E. Otis of the Herman Nelson Corp., Moline, Ill., was named chairman, the committee consisting of chairmen of the various code authorities of independent codes in the heating and ventilating industry which have been approved at Washington.

N. Y. Grunow Dealers See New Line; ABC Burner Shown

SYRACUSE, N. Y.—With 350 dealers and salesmen in attendance, the new 1934 Grunow refrigerator line was presented to representatives of the Morris Distributing Co., Northern New York distributor for Grunow refrigerators, and ABC oil burners at a meeting held last week in the Onondaga hotel here.

Grunow officials who presented the line included Dr. J. D. Jordan, chief physicist; J. J. Davin, sales promotion manager, and J. J. Dalton, division manager.

Also attending the meeting were representatives of the Automatic Burner Corp. including Joseph Hirsch, vice president and sales manager; Ed. Groves, division manager, and R. E. Caldwell, merchandising director.

The meeting was under the general direction of C. H. Ackley, general manager of the Morris Co. Maurice Horowitich, president of the distributorship, was host at a banquet.

Correction

Headed "Auditorium to License Air Conditioning Manufacturers," an article in the January 24 issue of ELECTRIC REFRIGERATION NEWS, beginning on page one and continued on page six, contained the following sentence:

"Manufacturers may then sell such unit air conditioners to anyone *with* restriction or further royalty payments to the Auditorium Conditioning Corp."

This sentence should have read:

"Manufacturers may then sell such unit air conditioners to anyone *without* restriction or further royalty payments to the Auditorium Conditioning Corp."

Arizona Dealers for Leonard Convene

PHOENIX, Arizona — Leonard distributors' representatives and dealers in this section of the West launched their 1934 selling program at a meeting in the Hotel Adams here recently, where they were addressed by Godfrey Strelinger, Leonard sales manager, of Detroit.

Mr. Strelinger was assisted in conducting the meeting by J. B. Nicholson, Leonard district manager of Los Angeles, and A. E. Gibson, district manager for Refrigeration Discount Corp., also of Los Angeles.

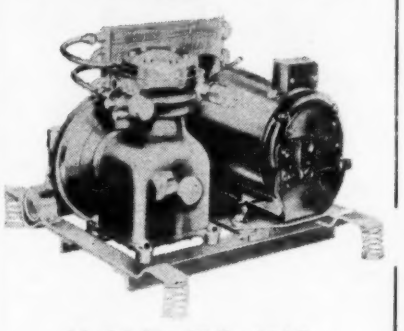
The sessions were attended by Fred Ryan, sales manager, Momsen-Dunnegan and Ryan, Phoenix and El Paso distributors; Edward B. Ryan, Jr., general manager of the company, and the following Arizona dealers:

Leroy Carver, Tucson; John McCormick, Flagstaff; C. J. Read, Warren Hunter, Oscar Coleman, E. T. Blake, G. J. Pattridge, A. J. Murray and R. G. Reed, all of Phoenix; Ernest Fannin, Stanley R. Iverson, Ray Fannin, H. G. Spring, C. C. Baldwin, all of Fannin's Hardware Co., Phoenix; R. M. Gassman, Flagstaff.

H. H. McMullen and George S. Hill, Sam Hill Hardware Co., Prescott; A. O. Tyler, Tyler Hardware Co., Coolidge; J. G. Alverez and Mose Kline, Douglas Furniture Co., Douglas; A. E. McKenzie, McKenzie Music Co., Tucson; Mr. and Mrs. M. L. Sutton, Sutton Electric Co., Mesa.

M. E. Curry, Tempe Hardware Co., Tempe; Alfred Sunfield, Standard Furniture Co., Globe; George R. Armstrong, Reliable Hardware Co., Chandler; George A. Baaks, Baaks Paint Store, Globe; O. O. Watson, Grebe Electric Co., Tucson; Ralph Davis, Northern Arizona Furniture Co., Winslow; J. Martiella Rodriquez Hardware Co., Nogales, and H. L. Swisher, Sine Brothers, Glendale.

Kellogg Units



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March 7 issue will be the Annual Exhibition Number of Electric Refrigeration News

THIS year the refrigeration industry will start the selling season with all signs pointing to the biggest year's business the industry has ever seen.

Dealers and distributors are anxious to get under way. Their interest in new models and new lines is at its height.

Since the industry does not have an annual show or exposition where all lines and models can be seen at one time and compared, the Annual Exhibition Number of ELECTRIC REFRIGERATION NEWS gives the field its only opportunity to get the whole picture of new equipment at one time.

In this March 7 issue of the NEWS the editors will show what the new models look like and will give a descriptive resume of the various 1934 refrigeration lines.

This issue will give all manufacturers a most effective background in which to present the salable points of their new products—an opportunity to show complete lines and describe each model in detail.

This Annual Exhibition Issue will also be ideally fitted to provide an exhibition for the manufacturers of parts and supplies, accessories, and related merchandise (articles to use with the refrigerator).

The Annual Exhibition Issue of ELECTRIC REFRIGERATION NEWS has always been one of the most popular issues of the year. Last year the call for extra copies of this issue definitely proved its popularity.

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Reserve your "exhibition space" now. The whole industry will have the "show" delivered to them and they can survey your products and your proposition at their leisure.

Advertising forms close March 3.

Features of Other Coming Issues

March 14—*Commercial Specifications Number*

Specifications on all commercial machines as well as news on the activities of commercial refrigeration dealers.

March 21—*Household Specifications Number*

A new tabulation of complete specifications of all models made by all manufacturers. Further details later.

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AIR CONDITIONING

Some Effective Cooling Possible at Night By Use of Attic Circulating Fans

NEW YORK CITY—Experiments in residential cooling by means of circulating fans were reported by two groups of engineers before the A.S.H.V.E. convention here last week. Both papers on the subject were presented to show an *economical* method of accomplishing a limited degree of home cooling in hot summer months, regardless of whether mechanical or ice cooling is used in conjunction with the system.

Neither was presented as an effective substitute for refrigerated cooling, but rather as a means of reducing the load on a refrigerating system or as a low-cost method of *partial* cooling.

Detroit Edison Report

First paper was entitled "Comfort Cooling with Attic Ventilating Fans" by G. B. Helmrich and G. H. Tuttle, both of Detroit Edison Co. Mr. Helmrich presented the paper, after explaining that experiments with residential cooling were started in the summer of 1932, and were continued last year by gathering operating data on three fan-cooled residences in Detroit.

"A study of the summer temperature records for Detroit shows that the outdoor temperature almost invariably drops below the inside temperature around 7 or 8 o'clock in the evening, and stays below for about 12 hours," Mr. Helmrich said.

This suggested the development of a method of drawing outdoor air through the rooms at these particular hours. It was felt that an attic fan could be used to pull air through the first floor rooms during the early evening (giving helpful air movement and cooling), in addition to providing more comfortable conditions on the second floor. Hence the studies were undertaken with the thought that the attic ventilating fan would provide a welcome improvement in comfort at low cost.

Three Types of Installations

Installations made were of three distinct types. One was a standard propeller fan, the second a centrifugal multi-blade fan, and the third a special centrifugal, steel-plate, curved-blade fan installed without a scroll.

Mr. Helmrich pointed out that the essential requirements for cooling systems of this kind are quietness of operation and low first cost. Fan efficiency is relatively unimportant, he said, because of the comparatively short season of use.

In one installation a multi-blade centrifugal fan was placed in the attic of an eight-room brick-and-stucco house. Suction side of the fan was connected to exhaust ducts leading to grilles in ceilings of two bedrooms, the air being drawn through the open bedroom windows and discharged into the attic where it flowed outdoors through louvres in the gables.

The second installation included a 10-blade propeller fan of the disc type installed at the head of the attic stairway of a six-room frame house. The fan was mounted over the attic stair well so that the entire attic stairway was placed under suction.

The air is drawn in open windows of three bedrooms into a central hallway, and from there up the attic stairs where it is discharged into the attic space and forced outdoors through special windows at either end of the attic. The layout of this system is shown in Fig. 1.

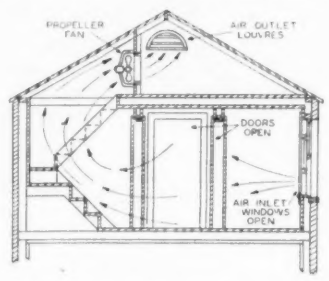

Fig. 1—Propeller fan installed for night cooling in Detroit.

Centrifugal Steel-Plate Fan

In an effort to avoid the noise inherent in propeller fans and to overcome the obstacle of higher installation costs of a system of ducts served by a centrifugal fan, Detroit Edison engineers devised the novel fan assembly indicated in Fig. 2.

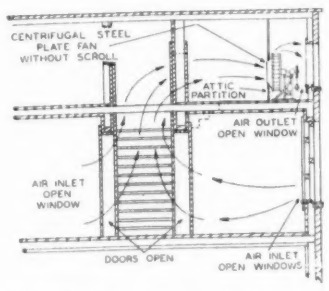

Fig. 2—Plate-type centrifugal fan devised for more quiet operation.

This assembly consists of a single inlet, backward-curved blade, steel-plate type, centrifugal fan mounted on a light angle iron frame which supports the fan wheel, shaft, two bearings, V-belt drive, and motor. No fan scroll was used, and the inlet was placed close to a circular opening cut in a plaster-board partition which served to divide a small attic space into a suction and discharge chamber.

As was the case with the propeller fan installation, air is drawn up the attic stairway, into the fan wheel, and discharged freely from the fan blades into this small chamber from which it is forced through open attic windows to the outdoors, see Fig. 2.

Operating Results

The centrifugal fan first described was operated about 150 hours during the past summer, and the occupants of the house were well pleased with the results obtained, Mr. Helmrich stated.

The temperatures in the two bedrooms to which the fan is connected were very responsive to the action of the fan, and the characteristic temperature curve for the larger of the two rooms is shown in Fig. 3.

It will be seen that the inside temperature can be made to follow the declining outdoor temperature curve very closely, the temperature at midnight being only about 2° F. above that for the outdoors.

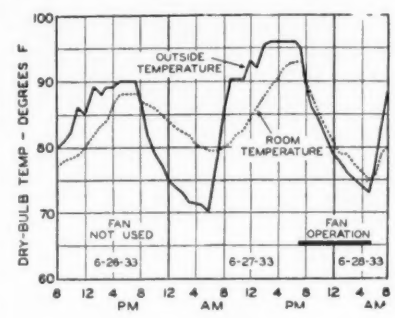

Fig. 3—Chart showing reduction of inside temperatures by attic fan operation.

This is in contrast to the conditions obtaining when the fan was not used, as the curves show the indoor temperature to be at least 8° F. higher than the outdoor at midnight, and additional temperature records show this difference to have been as high as 12° F. on some occasions, the speaker reported.

Anemometer readings taken at the ceiling grille showed an air velocity of about 330 ft. per minute, corresponding to 1,294 cu. ft. per minute passing through this room. As the volume of the bedroom was 2,180 cu. ft., this rate of air flow provided about 36 air changes per hour.

The propeller fan of Fig. 1 has a capacity of about 3,000 cu. ft. per minute, as determined by an anemometer, when pulling air through the three bedrooms. In this installation the fan was operated over shorter periods of time than the first installation, hence the bedroom temperatures were not dropped as far. "But during these short periods of operation, generally from 8 to 11 o'clock in the evening, the cooling effect was just as pronounced," Mr. Helmrich stated

He also pointed out on curves that a rather sharp rise in indoor temperature occurs after the fan is shut down. "This is characteristic of these installations," the speaker said, "due to the heating effect of the walls and ceiling."

Occasionally the fan was used during the early evening to ventilate the downstairs, with good results, particularly in the removal of tobacco smoke. To obtain best results, the bedroom doors had to be closed; under these circumstances about 30 air changes per hour were obtained in the downstairs rooms.

Centrifugal Steel-Plate Fan's Operation

The fan assembly of Fig. 2 was not installed until the latter part of the summer, hence but few temperature data are available. It was apparent, however, that it was capable of adequate ventilation of the three upstairs bedrooms, Mr. Helmrich declared.

In the first test the fan was operated at 390 r.p.m., anemometer measurements showing an air movement up the attic stairway of about 5,880 cu. ft. per minute. There was considerable noise at this speed, however, so the fan speed was reduced to 320 r.p.m., according to the speaker.

At the latter speed, an air volume of 5,040 cu. ft. per minute was moved up the attic stairway. With the downstairs closed up and windows open in two of the bedrooms, the air flow through one of the bedrooms was 1,580 cu. ft. per minute, and 2,600 cu. ft. per minute through the other. Since the volume of the second floor is about 5,800 cu. ft., this rate of flow provided about 52 changes of air per hour.

"With this rather high rate of air change, it seems certain that this fan will accomplish effective cooling," Mr. Helmrich averred.

"Since the attic ventilating fan is usually located directly over the sleeping rooms, it is quite essential that every possible precaution be taken to reduce the fan and motor operating noises to a level which is not objectionable to the occupants of the home.

"In the case of the centrifugal fan installation, both fan and motor were mounted on a wood platform which was insulated from the attic floor joists by strips of ½-in. sponge rubber, and rubber washers were used under all holding-down bolts. In spite of these precautions, the initial fan speed of 400 r.p.m. proved to be too high for quiet operation, and it was reduced to about 300 r.p.m.

"It was also found desirable to limit the velocity of the air through the ceiling grilles to about 400 f.p.m. in order to reduce the air noise. Motor noises have frequently proved troublesome, and the capacitor type of motor has been found particularly well adapted to this service because of its inherent quietness of operation.

"The propeller fan installation described in this paper was not satisfactory from the standpoint of noise. At the normal operating speed of 900 r.p.m. the blade tip speed was 5,000 f.p.m. and the air noise was quite disturbing. For that reason the fan usually was not operated after the occupants had retired for the night.

"Although strips of felt were placed between the fan casing and the wood studding to which it was bolted, this was not very effective in reducing the transmission of sound through the building structure. Experience thus far indicates that the tip speed of a ventilating fan should not exceed 3,200 ft. per minute if quiet operation is desired," Mr. Helmrich stated.

In concluding, he recommended a minimum of about 30 air changes per hour wherever possible with an installation of this kind, although as low as 20 may be satisfactory in large buildings which dictate the use of a proportionally smaller fan capacity.

Summary of Residence Cooling at University of Illinois

Series No.	Method of Operation at Night	Summer of 1932 Estimated No. of Days Requiring Cooling† June	July	Aug.	Sept.	Total	Ice Requirement Tons*	Summer of 1933 Estimated No. of Days Requiring Cooling† June	July	Aug.	Sept.	Total	Ice Requirement Tons*
1	Natural ventilation. 8 windows partly open at 9 p. m.	21	24	18	2	65	23	25	24	12	12	73	26
3	Basement fan. 8 windows partly open at 9 p. m.	11	18	11	0	40	14	21	18	6	8	53	19
2	Natural ventilation. All windows open at 6 p. m.	9	17	8	0	34	12	20	15	3	6	44	15
7 and 8	Attic fan. All windows open at 6 p. m.	7	15	7	0	29	10	19	14	3	6	42	15

*Based on an ice consumption of 700 lbs. per day. †Based on indoor temperature exceeding 81° F. at some time during the day.

shown in Fig. 4, permitted outdoor air to be drawn into the open first and second story windows at night, or to be drawn through a duct from a third story window in order to provide positive ventilation for the third story during the day.

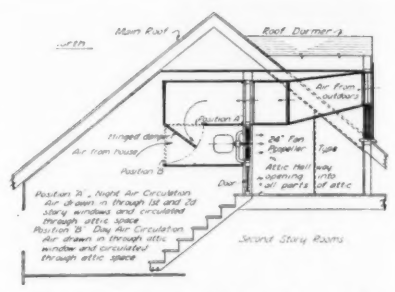
Main Roof
Roof Dormers
Air from outdoors
Position A
Hinged damper
Air from house
Position B
24" Fan Propeller Type
Attic Hallway opening into all parts of attic
Door
Position A - Night Air Circulation. Air drawn in through 1st and 2d story windows and circulated through attic space.
Position B - Day Air Circulation. Air drawn in through attic window and circulated through attic space.
Second Story Rooms

Fig. 4—Fan installation for night cooling of University of Illinois research residence.

This arrangement did not interfere with the full capacity of the fan for circulating the air at night, and the somewhat reduced capacity was more than sufficient for ventilating the attic during the day, Mr. Konzo explained. The fan delivered approximately 4,000 cu. ft. of air per minute.

Method of Conducting Tests

During the entire summer from May 23 to Sept. 23, continuous records were made, by means of temperature recorders, of the following air temperatures: outdoor, dining room, kitchen, first story hall, living room, east bedroom, southwest bedroom, northwest bedroom, and third story hall. Relative humidities both indoors and outdoors were observed by means of an aspirating psychrometer.

Twelve series of tests were run, each with a different condition of fan or ice plant operation, or tempering different parts of the house.

When night cooling with outdoor air was used to supplement cooling with

(*Concluded on Page 15, Column 4*)

Reports of Summer Cooling Research at Illinois

Second paper on the same method of cooling was "A Study of Summer Cooling in the Research Residence for the Summer of 1933," giving the results of research conducted in cooperation with the A.S.H.V.E. and the National Warm Air Heating and Air Conditioning Association in the "research residence" at the University of Illinois, Urbana, Ill. The paper was prepared by Prof. A. P. Kratz and S. Konzo of the University's staff, and was given by Mr. Konzo.

The past summer's investigations in the Illinois residence were undertaken to determine to what extent the circulation of outdoor air at night could be used to supplement ice cooling during the day, thus reducing the amount of ice required, and to what extent it could be used to eliminate the necessity for additional cooling during the day, Mr. Konzo stated.

The research residence is a two-story frame house with an attic above, and is equipped with a forced-air heating system and an ice-cooling system. For last summer's work it was provided with awnings on all east, south, and west windows, and the sun parlor was isolated by the rest of the house by doors opening into the dining room.

The arrangement of the attic fan is shown in Fig. 4. This 24-in. fan was installed in the doorway at the head of the stairs leading from the second to the third story. Thus the air was delivered into the attic space at a point approximately centrally located with respect to the horizontal plane of the third story. It was allowed to escape through windows on all sides.

The use of a box and hinged damper on the suction side of the fan, as

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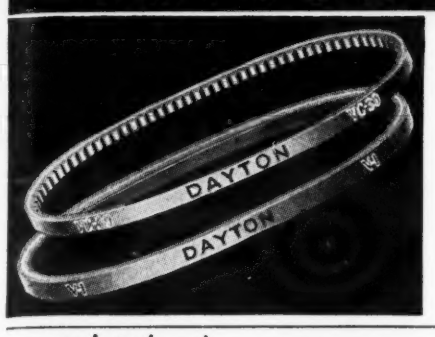

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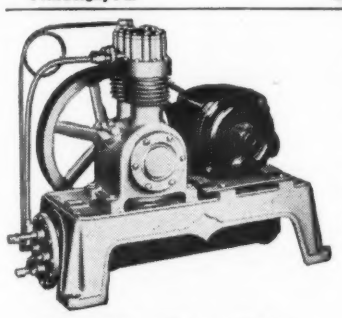

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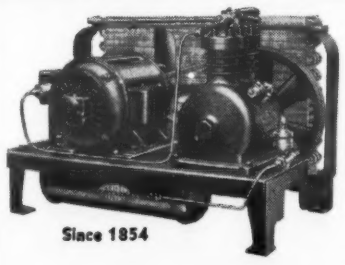

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PATENTS

Issued Jan. 30, 1934

1,944,899. SAFETY DEVICE FOR REFRIGERATION SYSTEMS. Ernest B. Miller, Baltimore, Md., assignor, by mesne assignments, to Chester F. Hockley, receiver for The Silica Gel Corp., Baltimore, Md., a corporation of Maryland. Application April 8, 1930. Serial No. 442,598. Renewed April 19, 1933. 7 Claims. (Cl. 62—2.)

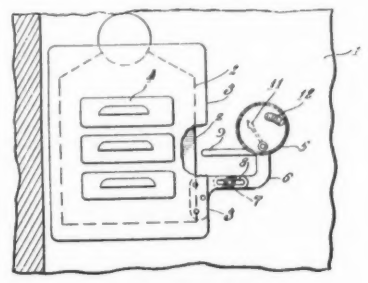
1. In a refrigeration system, in combination, a plurality of evaporators containing a liquid refrigerant, a refrigeration device remote from the evaporators and including a condenser and a condensate receiver, vapor pipe lines associating the low side of the evaporators and the refrigeration device, liquid pipe lines associating the high side of the evaporators and the receiver and means in said last mentioned pipe lines adjacent the receiver to limit the quantity of condensed refrigerant which can flow in each under the expanding action of the liquid in a predetermined period of time.

1,944,992. AIR CONDITIONER. Samuel C. Miller, Louisville, Ky. Application Dec. 29, 1932. Serial No. 649,383. 4 Claims. (Cl. 257—244.)

1. In an air conditioner, a heat exchanger having conduits for conveying cold water therethrough and located above the room to be cooled, and having air passages in circuit with the air of the room, a supply pipe from a deep well to said heat exchanger, and a discharge with a trap at lower end for the water, said discharge balancing the lift on the supply side and reducing the power required for elevating water to the heat exchanger.

1,945,100. DEFROSTING INDICATOR FOR MECHANICAL REFRIGERATORS. Frederick J. Troll, Towson, Md. Application Aug. 24, 1932. Serial No. 630,315. 4 Claims. (Cl. 177—311.)

4. An indicating instrument for use in connection with a mechanical refrigerator having a chilling element, the same con-



1,945,100

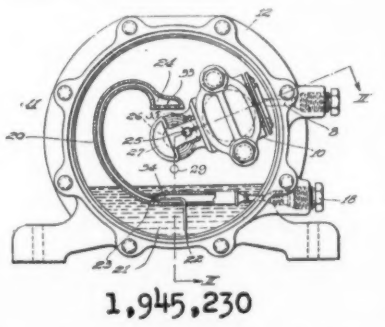
sisting of a thermally sensitive element, an indicating device connected thereto to be controlled thereby, the thermally sensitive element being located immediately adjacent the chilling element and spaced therefrom by an interval equal to the thickness to which the frost is to be permitted to accumulate, contact of the frost with the thermally sensitive element serving to operate the indicator thereby to indicate the need for defrosting.

1,945,103. EVAPORATOR. George A. Vis, Detroit, Mich., assignor to Kelvinator Corp., Detroit, Mich., a corporation of Michigan. Application Jan. 5, 1929. Serial No. 330,466. 15 Claims. (Cl. 62—95.)

1. A refrigerating apparatus including a cooling unit comprising a metallic sleeve member of substantially rectangular cross-section provided with a plurality of transversely extending spaced integral fins upon three sides of its exterior surface, and a cooling coil surrounding said sleeve, said coil comprising a single helically wound tube disposed in the space between adjacent fins over the three finned sides of the sleeve and passing to the next adjacent fins while crossing over the fourth side of said sleeve.

1,945,230. MEANS FOR FORMING ICE CUBES. George Lange, Rockville Center, N. Y. Application June 27, 1931. Serial No. 547,349. 9 Claims. (Cl 62—108.5.)

1. Apparatus for forming ice cubes including a container for holding a body of



1,945,230

water, freezing elements adapted to hang in the water, connections for the circulation of a refrigerant in said elements at one temperature to build up a jacket of ice on each element and at a higher temperature to release the jackets from the elements, and means for lowering the water to a level below said elements to receive and support the released jackets.

1,945,338. PUMPING UNIT FOR REFRIGERATING APPARATUS. Matson C. Terry, Longmeadow, Mass., assignor to Westinghouse Electric & Mfg. Co., a corporation of Pennsylvania. Application June 13, 1931. Serial No. 544,264. 4 Claims. (Cl. 230—58.)

1. In a compression type refrigerator, a compressor having parts requiring lubrication, a casing for the compressor, a lubricant reservoir formed by the casing, means providing a suction passage for the compressor including a conduit and an injector for supplying lubricant from the reservoir to the conduit and motivated by gaseous media passing therethrough, said conduit being arranged to supply lubricant to said compressor parts.

1,945,411. AIR-CONDITIONING SYSTEM. Ernest Baldwin Miller, Baltimore, Md., assignor, by mesne assignments, to Chester F. Hockley, receiver for The Silica Gel Corp., Baltimore, Md., a corporation of Maryland. Application Nov. 16, 1931. Serial No. 575,402. 18 Claims. (Cl. 62—176.)

1. The method of conditioning air supplied to an enclosure which consists in mixing two streams of air to form a third stream, one of said streams being supplied from the enclosure at a constant rate, another stream being supplied from outside air at a constant rate, treating the air of at least one of said streams to remove moisture therefrom and treating air of at least one stream to bring it to a fixed temperature such that the temperature of the air delivered to the enclosure will cause no discomfort to an occupant of the enclosure.

Home Cooling Data Reported by Konzo

(*Concluded from Page 14, Column 5*)

ice in the daytime, the cooling plant was adjusted so that the rate of ice meltage could not exceed the equivalent of 700 lbs., exclusive of the basement loss, in about 5 hours.

After closing the windows and stopping the fan in the morning the indoor temperature was allowed to rise until it reached 81° F., at which time the cooling plant was started.

This was allowed to operate at a constant rate until the entire 700 lbs. of ice were melted unless the indoor temperature decreased below 79° F., or unless the outdoor temperature dropped more than 3° F. below the inside temperature.

In the case first mentioned, the cooling plant was stopped until the inside temperature again rose to 81° F. In the second case the cooling plant was stopped for the night and the windows were opened and the fan started.

Recirculate Air

Whenever the ice plant was stopped before the time that the windows were opened, the pump was stopped, thus discontinuing the circulation of water through the cooling coil, but the fan was allowed to run in order to maintain recirculation of the air in the house.

The 3° F. difference between indoor and outdoor temperatures was allowed in order to provide for the difference in relative humidity indoors and outdoors. The latter difference was such that it required about 3° F. lower dry-bulb temperature outdoors in order to have the same *effective* temperature both indoors and outdoors.

"Experience at the research residence seemed to indicate that approximately 82° F. dry bulb was a critical temperature from the standpoint of comfort. Without artificial cooling, and with the usual indoor relative humidity of from 50 to 60%, conditions were reasonably comfortable if the indoor temperature did not exceed 81° F.

"This was equivalent to an effective temperature of between 74° and 75.5° F. Hence 81° F. dry bulb was accepted as the upper limit for comfort without cooling, and, for the cooling tests, the cooling plant was started when the indoor temperature reached 81° F.," the speaker said.

"Under these conditions, owing to the reduction in indoor relative humidity when the cooling plant was in operation, the effective temperature remained somewhat below the 75° F. indicated as the upper limit on the comfort chart."

Supplemented by Cooling

After a discussion of the various test series, Mr. Konzo averred that night operation with a fan, even under the most favorable conditions, cannot be depended upon to produce comfort during the whole summer in a climate like Urbana unless it is supplemented part of the time by artificial cooling.

"During the summer of 1932, which included 1,538 degree-hours above 85° F.," Mr. Konzo pointed out, "43 tons of ice were required under the system of operation followed for that summer.

"It is of considerable interest to note that if advantage had been taken of the possibility of circulating night air and an attic fan had been used under conditions corresponding to those for two of our tests, the probable ice requirement would have been only 10 tons. With natural ventilation with all windows open the requirement would have been 12 tons, and with the basement fan with eight windows partly open it would have been 14 tons. Even with the least favorable method of night operation the requirement would have been only 23 tons.

"The summer of 1933 included 2,310 degree-hours above 85° F., and, as indicated in the table (on page 14), the ice requirements would have been somewhat greater than those for the summer of 1932.

"However, the table presents concrete evidence that even the least favorable method of circulating the cool air from outdoors at night, when used to supplement some form of artificial cooling during the day, has merit as a means of reducing the cost of summer cooling to an amount that may not be prohibitive for the average householder."

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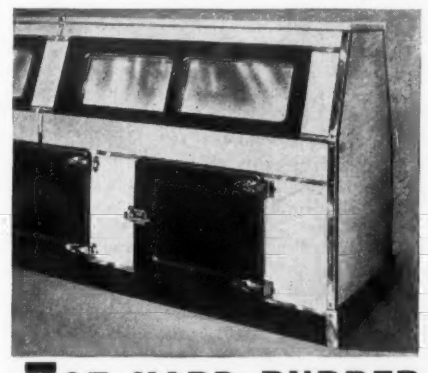

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